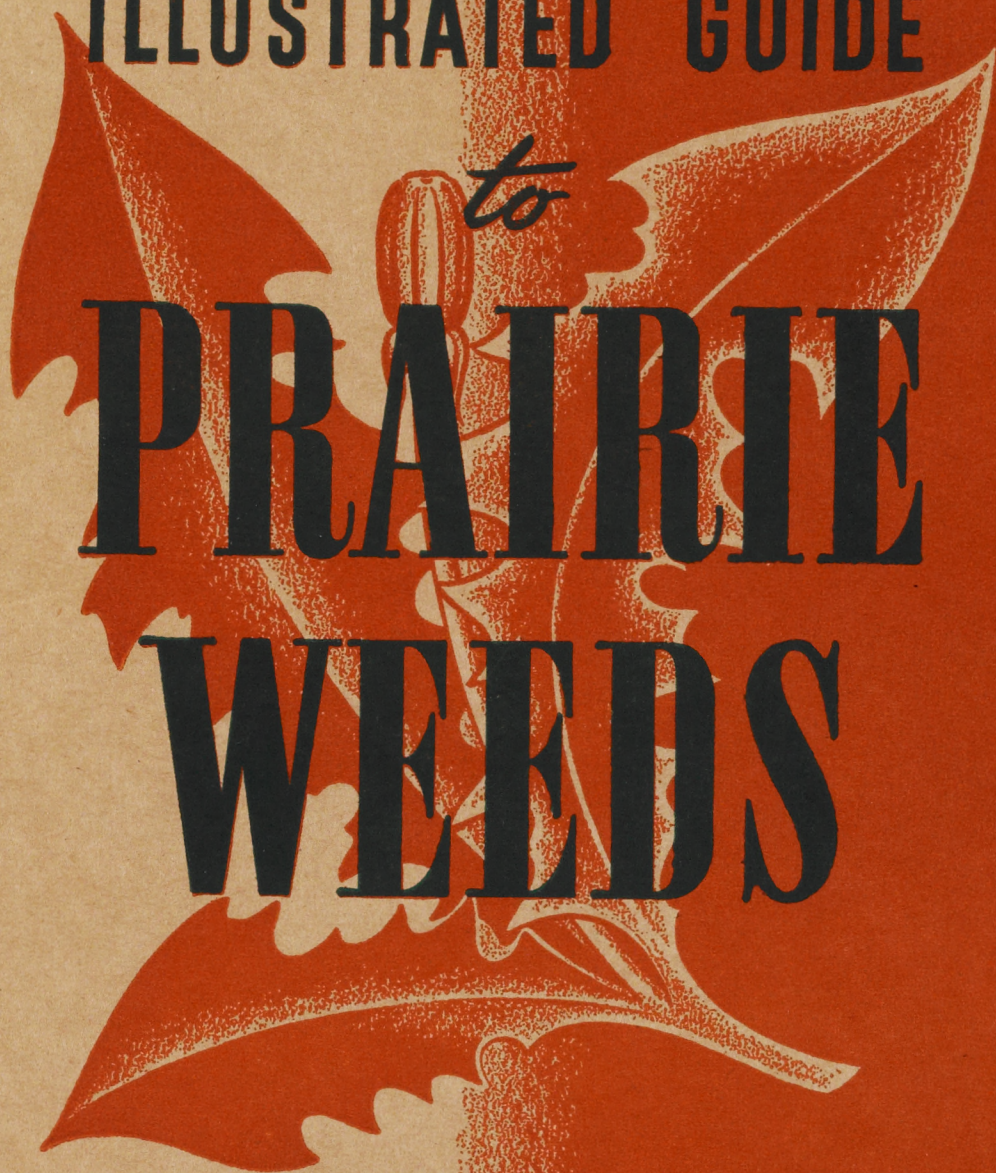


An
ILLUSTRATED GUIDE

to

**PRAIRIE
WEEDS**



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AN ILLUSTRATED GUIDE TO PRAIRIE WEEDS

Originally Prepared by
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THIRD EDITION

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Photo by Dr. R. D. Bird

"I will go root away
The noisome weeds, that without profit suck
The soil's fertility from wholesome flowers."

—SHAKESPEARE (*King Richard The Second*, III, 4).

FOREWORD

IN recent years farmers and others concerned in the welfare of Canadian Agriculture have come to realize the tremendous toll weeds take annually. Weeds rank second only to moisture as the main factor limiting crop production in Western Canada. In addition, weeds add very materially to the cost of producing crops. While moisture supplies are largely beyond human control, weeds are controllable. This is borne out by the fact that in most districts one sees the occasional farm that has been kept almost free of weeds.

The growing consciousness on the part of farmers that weeds constitute one of the major problems in prairie agriculture fortunately coincides with two recent advancements: viz., (1) farm mechanization, providing the farmer as it does with ample power and improved tillage implements; (2) the introduction of several chemicals which are having far-reaching effects in weed eradication. Intelligent use of these two aids in the ensuing years should go far to master weed problems that heretofore seemed impossible of solution. Even today, farmers are waging a successful war on weeds.

The first approach to the weed problem is necessarily a recognition and an understanding of the nature and habits of the weeds likely to be met with on the individual farm. Combining as it does a series of excellent pictures of the most common prairie weeds, with a brief and interesting description of each, this bulletin is invaluable to farmers, country school teachers and pupils, agricultural students, farmers' organizations, and others seeking reliable information on the subject of weeds. The need for a fuller knowledge of weeds and their habits of growth cannot be over-emphasized.

The sponsors of Line Elevators Farm Service are to be most highly commended for publishing the Third Edition of this excellent bulletin, "An Illustrated Guide to Prairie Weeds."

H. E. WOOD,
Chairman, Weeds Commission,
Manitoba Department of Agriculture

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INTRODUCTION

THE main purpose of this bulletin is to assist farmers and others in identifying the weeds most commonly found on prairie farms. Sixty-seven different weeds are illustrated and described, and brief mention is made of others. Some of the common weed plants, which are of little economic importance, have necessarily been omitted. In describing the different weeds the use of technical terms have been avoided wherever possible. This bulletin has been prepared in the hope that it will help farm people with a minimum amount of detailed knowledge about plants to identify almost every weed they are likely to find. Most of the plant photographs were taken by Dr. K. W. Neatby, formerly Director, Line Elevators Farm Service, in the course of his travels in the Prairie Provinces during the summer of 1941.

In preparing this publication the interests of young farm people and school children have been kept in mind. Botany can be a dry subject if it is taught from books alone, or by an uninterested teacher. On the other hand, if properly taught, it can be made a fascinating subject to almost all young people. With this in mind then, various items of general botanical interest have been included in the descriptions, in the hope that the study of weeds undertaken for economic reasons will stimulate an interest in and a study of plant life in general.

Weeds cause enormous annual losses in Western Canada. It has been estimated by H. E. Wood, Chairman, Manitoba Weeds Commission that, in the three prairie provinces, the loss from weeds in 1953 amounted to the staggering sum of \$255,000,000, a figure which represents an average loss of over \$1,000 per farm for the 248,000 farms in the Prairie Provinces.

Good farmers, of course, always lose much less from weeds than do inefficient ones. As weeds increase the farmers' resources decrease, and consequently it becomes increasingly more difficult for him to secure the necessary power and equipment for effective tillage practices, and to purchase and apply the chemicals that would help him to eradicate them. In the final scene of the tragedy, weeds take over and the municipality inherits the farm.

The most important method of control is prevention. Most weeds, particularly perennial weeds, can be eradicated relatively cheaply if caught in time. Once an infestation gets out of hand, however, eradication may cost almost as much as the land is worth. It is easy to learn to recognize dangerous weeds, and it is hoped this bulletin will help.

No attempt is made here to give specific recommendations for weed control. The type of soil, available equipment, type of farming followed, crops grown, and many other factors have an important bearing on the suitability and effectiveness of any particular method of control. Moreover, good farmers know more about weed control in their own district than any bulletin writer. A few general remarks on control may, however, be helpful.

In any weed control program the first point to determine is the type of weed to be controlled. Is it an annual, winter annual, biennial or a perennial weed? In the case of annuals, seed production should be prevented whenever possible, and seed germination encouraged in the Fall and early Spring. Annuals which germinate in the Fall usually winter-kill. Many which germinate in the Spring can be destroyed by tillage before seeding, and after the grain is up. Thorough fall tillage is very important for winter annuals and biennials. In cases where livestock are an important part of the farm economy, annual weeds can be fought with green feed crops. It is always important, of course, to plant good, clean, treated seed, and hence to secure good, thick, uniform field stands of grain, since many weeds will thrive in a poor stand of grain, but starve in a good one.

Generally speaking, perennial weeds are more difficult to control than are annual weeds. Most perennial weeds can be effectively controlled by efficient tillage operations. However, heavy infestations of the more persistent perennials require intensive cultivation, alternating with cropping, in a program that must be carried on over a number of years.

In recent years remarkable advances have been made in chemical methods of weed control. In fact it is true to say that more has been learned about chemical weed control during the last ten years than in the whole of the previous fifty. Each year a number of new chemicals are added to the list of effective weed killers. Furthermore, considerable progress is continually being made with respect to the development of machines and methods for applying them to growing crops.

At the present time three different groups or types of chemical weed killers are in general use in Western Canada. The first group includes the soil sterilants such as Sodium Chlorate, or commercial preparations containing this chemical; the Borates, alone or in mixtures with Sodium Chlorate; and CMU. These chemicals leave the soil sterile for one or more years following their application. The soil-sterilant chemicals are used on difficult-to-control weeds where sterilization of the soil for a year or more is not a serious matter. They are a valuable aid in the fight against Toad Flax, Leafy Spurge, Russian Knapweed,

Hoary Cress and other persistent weeds which are resistant to selective herbicides.

Also included in the first group of herbicides are the partial soil sterilants, such as IPC, TCA and Dalapon. While these cause a sterilizing effect on the soil, the residual effect disappears quite rapidly, depending, of course, on the rate of application. At low rates these chemicals have proven effective in controlling Green Foxtail in flax and peas. At higher rates, they have given good control of Couch Grass. Fall applications of IPC, TCA, and Dalapon to soil infested with Wild Oats offers promise for the eventual practical control by chemical means of Western Canada's worst weed enemy.

The second group of weed-killing chemicals includes the systemic herbicides—2,4-D, MCP, 2,4,5-T, and others. 2,4-D has proven effective in controlling many broad-leaved weeds in cereal crops and flax, and for the control of many types of woody growth. The chemical MCP is less harsh on crops that are sensitive to 2,4-D damage, oats and flax for instance, and is more effective than 2,4-D on certain weeds such as Hemp Nettle and Canada Thistle. The chemical 2,4,5-T is used extensively in controlling species of brush and woody growth resistant to 2,4-D.

The dinitro compounds comprise the third chemical group. While these herbicides are effective in selectively controlling many annual weeds commonly found in cereal and legume crops, the large amount of water required per acre (50 to 80 gallons) for their application, strongly discourages the use of them on crops where 2,4-D or MCP can be used satisfactorily.

No attempt is made to give detailed information concerning the control of weeds with chemicals. However, where sufficient research and field testing information is available, a brief statement is made under each weed with respect to the chemical or chemicals that have proven effective in its partial or complete control.

The best advice we can give to prairie farmers interested in the use of chemicals for weed control is this. Keep in touch with the investigations and recommendations of your Provincial Department of Agriculture and University. Literature dealing with this subject, and with weed problems in general, is issued from time to time in all three prairie provinces. Farmers should not fail to secure all available information. They will find University and Government officials willing and anxious to assist in every way possible.

A bulletin of this kind would be incomplete without a word of advice. It is this: *Be sure you can identify every weed on your farm.* If you can, there is no danger of sheltering a dangerous enemy without

at least knowing he is there. Without charge, you can have weeds identified through any one of the following agencies:

- (1) Your local Agricultural Representative.
- (2) Your nearest Experimental Farm or Station.
- (3) Your Provincial Department of Agriculture or University.

- (4) By sending them to the Division of Botany, Canada Department of Agriculture, Ottawa.

- (5) Last, but not least, by delivering them to a grain buyer of any of the Line Elevator Companies listed on the back cover of this bulletin. The Agent will send them in to Line Elevators Farm Service in Winnipeg for identification. A weed identification service, organized by this Department in 1940, has been widely used by farmers. The convenience of simply handing weeds to local grain buyers has a strong appeal. We must, however, emphasize the following point with respect to collecting weeds or other plants for identification: *Be sure and secure complete specimens including roots, stems, leaves and flowers.*

Since 1941, eighty thousand copies of this bulletin (First Edition—50,000 copies, Second Edition—30,000 copies) have been distributed to farmers, schools, colleges, universities, farmers' organizations, and other agencies interested in the welfare of agriculture in Western Canada. The Second Edition is now exhausted, but the demand continues. To meet the urgent request from farmers, rural school teachers, agricultural students, 4-H Club members and others for information on weeds, a Third Edition of "An Illustrated Guide to Prairie Weeds" is being published at this time.

The sponsors of the Line Elevators Farm Service are confident that this bulletin will continue to serve a useful purpose. The Third Edition of "An Illustrated Guide to Prairie Weeds" is published in the hope that it will stimulate a deeper and wider interest in the study, by the rural young people of the Prairie Provinces particularly, of farm weeds in general, their habits of growth, and the best methods of combating them.

The writers desire to express their gratitude to Dr. R. D. Bird, Entomological Laboratory, Canada Department of Agriculture, Brandon, Manitoba, for taking the four excellent color photographs. We are also greatly indebted to H. E. Wood and H. A. Craig of the Manitoba Department of Agriculture, Winnipeg, for their assistance in identification problems, and for helpful suggestions regarding control measures. The writers, however, accept full responsibility for the information presented in this bulletin.

GRASS FAMILY

(Gramineae)

THERE are, in the United States and Canada, over eleven hundred species of grass, of which about a thousand are native, the remainder having been introduced from other countries. No other family of plants can compete with the grass family in importance to man. Wheat and rice belong here as, also, do rye, oats, barley, sorghums, millet, maize and sugarcane. Then, since most livestock are largely dependent upon grass, we should be on short rations if the world crop of grasses were to fail. In tropical Asia, the bamboo, also a grass, is used for a wide variety of purposes. It sometimes reaches a height of one hundred feet with stems over a foot in thickness. In Europe and America it is useful for walking sticks, binder whips and for disciplining troublesome boys. Several grasses are common weeds. Couch Grass and Wild Oats are too well known to need any description. Sweet Grass (not illustrated in this bulletin) is often very persistent on fertile, low-lying, cultivated ground.

OLD WITCH GRASS

(*Panicum capillare*)

Old Witch Grass is a first cousin to the proso type of millet (*Panicum miliaceum*), which it resembles quite closely. It is an annual plant and produces an abundance of seed. The stems are nearly erect but commonly curved and nearly prostrate at the base. Both leaves and stems are hairy. When the plant is ripe, the panicle frequently breaks off and blows about like a tumbleweed, leaving a trail of seed in its path.

This is not a dangerous weed but is common in gardens, fence corners and roadsides. It is unsightly, and should be destroyed before ripening.



OLD WITCH GRASS

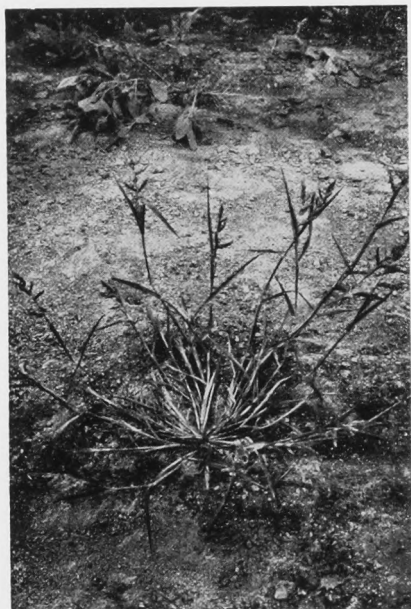
BARNYARD GRASS

(*Echinochloa crusgalli*)

THIS grass is, also, really a millet, being essentially similar to the Japanese variety. The name, *Echinochloa*, is derived from a Greek word meaning "hedgehog grass." Barnyard Grass was introduced from Europe (accidentally, no doubt), and has become widespread in the eastern, central and southern United States and Canada. Usually, it is confined to moist, fertile ground where it often becomes a pest.

The plant is a vigorous annual, often reaching a height of three feet or more. The accompanying photograph illustrates a typical plant, and shows how the stems tend to rest on the ground. The panicles are of a dark purplish colour, and the stems are often partly red. Under favourable conditions it may multiply rapidly through an

abundant crop of seed. According to Muenscher ("Weeds," page 152), Barnyard Grass is a troublesome weed in rice fields, but plant breeders will have a long row to hoe before the rice region extends to the Canadian prairies.



BARNYARD GRASS

The only effective control is clean cultivation. The semi-prostrate habit of the stems makes it difficult to prevent seed formation by mowing. In gardens, field headlands and elsewhere, plants missed by cultivation should be pulled or hoed out before the seeds ripen.

GREEN FOXTAIL

(*Setaria viridis*)

ANOTHER 'poor relation' of the millets! The resemblance of Green Foxtail to the foxtail millets is quite apparent in the accompanying picture. It is an annual plant introduced from Europe. From its own point of view, it is an unqualified success, being common from coast to coast. In some districts this is apt to be a serious weed, and to reduce the yield of grain crops. However, it is probable that when Green Foxtail appears serious, yields would be light in any case due to drought. In other words, it cannot compete successfully with a vigorously growing crop, but thrives in crops stunted by drought.

Seeds of Green Foxtail are common impurities in clover seed, and this has been an important factor in the wide distribution of the weed.

According to Muenscher ("Weeds," page 169), the seeds will not germinate in the fall of the year in which they are produced, but remain dormant until the following spring. The most important feature of control methods is, therefore, the prevention of seed formation. Summerfallow or green feed crops offer most promise. The problem is similar to that presented by Wild Oats, but usually less serious. Sheep are said to render valuable aid in control by close grazing and the prevention of seed formation. Green Foxtail often thrives on soils too poor or dry to offer favourable conditions for Wild Oats.

Seeding badly infested fields to flax and spraying with TCA will control this weed.



GREEN FOXTAIL

WILD OATS

(*Avena fatua*)

WILD Oats take a heavier toll from agriculture than any other weed. This weed is distributed all over the settled areas of the prairie provinces; but is a serious problem only in the relatively moist regions. At least, it is less serious in the drier areas.

The plant and its seeds are familiar to all, and so description is not necessary. It is well to point out, however, that natural crossing between wild and tame oats is probably quite common, and this accounts, in part, for the variety of intermediate types often found in oat fields. The seed is typically black or greyish black, but the seeds of true Wild Oats are sometimes almost white.

Three characteristics are largely responsible for the difficulty in controlling Wild Oats. These are: (1) early ripening and ready shattering; (2) difficulty in separating from wheat, oats and barley; (3) dormancy of seeds. We have no variety of wheat, oats or barley which even if seeded early will ripen early enough to be harvested before any Wild Oats ripen, fall to the ground, and infest the soil.

Thorough cultivation of infested fields in the spring, followed by

delayed seeding of an early maturing crop of barley or green-feed, is recommended for the control of this weed. It is commonly agreed that deep plowing only aggravates the Wild Oat problem by burying seeds which may live for two or three years. Summerfallow, succeeded by green feed or hay crops, may not completely eradicate, but will greatly reduce an infestation. The results of field experiments made in 1954 indicate that chemicals may soon offer an effective means of control. Today, however, there is no satisfactory, practical method of controlling Wild Oats by chemical means.



WILD OATS

COUCH GRASS

(*Agropyron repens*)

THE Latin name of this weed means 'creeping field wheat'. It does look like wheat; and who will deny that it creeps? It is a persistent perennial introduced from Europe.

There are several species of the genus *Agropyron* on the prairies, but only two likely to be confused with Couch Grass. Western Wheat Grass (*A. Smithii*) has a greyish blue colour, and the leaves tend to roll when moisture runs short. Couch Grass, on the other hand, has a rich green colour, and the leaves may wilt, but do not roll. Both have creeping rootstocks. Slender Wheat Grass (*A. tenerum*), also known as Western Rye Grass, is a well known hay crop. It can readily be distinguished from Couch Grass by virtue of its more slender, laxer spike and the absence of rootstocks. The rootstocks of Couch Grass are conspicuous, whitish, and have very sharp tips.

Like Wild Oats, Couch Grass is a lover of good fertile soil and reasonably abundant moisture. Two approaches to Couch Grass control are advocated. (1) Dragging the roots to the soil surface by means of the duckfoot cultivator or spring-toothed harrow where the heat of the sun will kill them. (2) Starving the roots by cutting off the top growth with a one-way disc. Of the two methods, starving the roots by removing top growth, is the more economical. For this purpose, cultivations should begin about June 15. A sharp, properly adjusted one-way is required, and cultivation must be repeated about every two weeks. One season of timely, careful cultivation will 'clean up' a badly infested field.

TCA (Sodium Trichloroacetate) is being used to control small patches of Couch Grass in fields. Where the soil is not disturbed, 80 to 100 pounds of TCA per acre are required to eradicate the weed. Where the soil is first cultivated and the roots brought to the surface, 15 to 20 pounds of TCA per acre have given excellent results.



COUCH GRASS

WILD BARLEY

(*Hordeum jubatum*)

WILD BARLEY is known by a variety of common names including Foxtail, Squirrel Tail and Skunk Tail. It is closely related to cultivated barley (*Hordeum vulgare*). This is a native perennial which is widely distributed. In Canada, it is found all the way from Labrador to the Alaskan boundary.

While annoying and very unsightly, Wild Barley is not as a rule a serious field weed except in run down hay meadows. It likes relatively moist low ground and thrives in road ditches. The seeds blow about very readily, and are a nuisance in clothing. They are apt to be worse than a nuisance in hay, since they may cause serious inflammation in the mouths of livestock.

OTHER GRASSES

Sweet grass (*Hierochloe odorata*) has already been mentioned. It bears a superficial resemblance to Kentucky Blue Grass, from which it may readily be distinguished by its fragrant odor.



WILD BARLEY

Chess (*Bromus secalinus*) and Downy Brome Grass (*B. tectorum*) are two relatives of cultivated brome grass which are often troublesome. Downy Brome is causing concern in southwestern Alberta.

Darnel (*Lolium temulentum*) is a common annual. The plants resemble the wheat grasses (*Agropyron* species), but differ chiefly in that the spikelets are arranged with their narrow sides against the rachis (stem). They look like tiny wings. Darnel is spreading in the prairie provinces. It is, in fact, becoming a rather serious weed in the Peace River district of Alberta.

BUCKWHEAT FAMILY

(*Polygonaceae*)

BESIDES a few important weeds, this family includes rhubarb and buckwheat. Two other members, Knotweed and Wild Buckwheat, are quite familiar to all prairie dwellers.

DOCK

(*Rumex* spp.)

Several species of the genus *Rumex* are common in the prairie provinces, and all of these are perennials. Specimens of the dock illustrated on this page were not preserved, so we are not sure to which species the plant belongs. It is probably Pale Dock (*R. triangulivalvis*). This is a more common dock on the prairies than Curled Dock (*R. crispus*). The plants of Pale Dock are upright in habit. The leaves are rather flat and narrow and decidedly pale green in colour. Docks similar to the one illustrated are quite common.

Sheep Sorrel (*R. Acetosella*) is a very persistent perennial, reproducing by seeds and spreading by creeping rootstocks. The stems are not, as a rule, over one foot in height, and the leaves are small and arrow-shaped. Sheep Sorrel is often found in grain fields, pastures, gardens and roadsides. It is not yet widely distributed in the prairie provinces, but threatens to become a serious pest in some districts.

Most of the Docks are quite resistant to 2,4-D. However, a heavy application when the plant is small will often seriously stunt its growth and reduce its competition with the growing crop.



DOCK

KNOTWEED

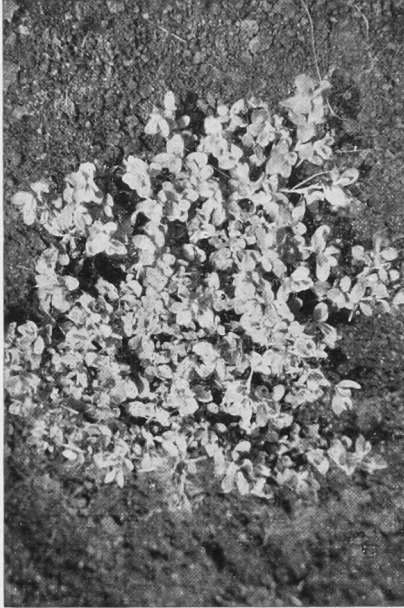
(*Polygonum achoreum*)

VERY few residents of the prairies have not walked over Knotweed; in fact, most farmers do so every day from April to November. The more it is trampled under foot, the more it thrives. The plant is almost invariably found about dwellings, stables, gardens and pathways; but rarely in cultivated fields, and then only scattered plants.

Knotweed is a native annual. It scarcely needs description. It may readily be recognized from the accompanying illustration and the foregoing remarks. The leaves are rather pale green, and the plants generally upright in habit. The flowers are rather inconspicuous and usually yellowish green in color.

Another kind of Knotweed (*Polygonum aviculare*) is also very common, and is found in similar places. The plants of this species, however, lie more or less prostrate on the ground.

Lady's Thumb or Smartweed (*Polygonum persicaria*) is a close relative of the Knotweeds, but unlike them it is quite troublesome in cultivated fields. The stems are erect with swollen joints. The leaves are alternate, long and narrow, and usually marked with a triangular dark patch. Lady's Thumb is an annual plant of common occurrence on the prairies.



KNOTWEED

A heavy application of 2,4-D will often control the top growth of Knotweed and Lady's Thumb (Smartweed). However, one application of 2,4-D rarely results in complete eradication of these pests.

WILD BUCKWHEAT

(*Polygonum Convolvulus*)

THE Latin name of this weed means the *Convolvulus*-like *Polygonum*. This provides a good example of how some plants look quite similar, but are really very distantly related. Wild Buckwheat is comparatively low in the scale of the evolution of seed plants, while species of *Convolvulus* are quite high. A glance at the illustrations of Wild Morning Glory and Field Bindweed on pages 52 and 53 will make it clear why Wild Buckwheat was named *P. Convolvulus*. All three species are 'twiners,' and have similarly shaped leaves. The flowers and seeds, however, are quite different, and these characters are much more reliable guides to true relationships than are leaves.

Wild Buckwheat is a very common weed in cereal crops all over Canada and the northern States. It is an annual introduced from Europe. Undoubtedly, it causes substantial losses in yield of field crops, and is responsible for a large proportion of the 'dockage' in commercial wheat. The seed can be removed from wheat only with difficulty.

Wild Buckwheat is quite resistant to 2,4-D. Treatment when the plant is small, however, often sets it back severely and reduces competition with the growing crop. Seed production is also reduced. Complete control with 2,4-D is rarely achieved.



WILD BUCKWHEAT

TARTARY BUCKWHEAT

(*Fagopyrum tataricum*)

THERE are two species of cultivated buckwheat. One, Common Buckwheat (*Fagopyrum esculentum*), is quite an important crop in eastern Canada, the annual production being about seven million bushels. United States production is about the same. It has not been grown in the West to any extent because the demand is limited, it is a poor weed fighter, and is very susceptible to spring and fall frosts.

Tartary Buckwheat is a very vigorous, hardy plant. It is grown at high altitudes in the Himalayan region and in eastern Asia. In comparison with Common Buckwheat, it is resistant to frost and will yield more, but the grain is somewhat inferior in quality.

So far as the prairie provinces are concerned, Tartary Buckwheat should be regarded as a weed, and a dangerous one. The plants are often from two to three feet in height, and produce an abundance of seed. It is almost impossible to remove the seed from wheat and, conse-

quently small quantities of Tartary Buckwheat will result in commercial wheat being graded 'rejected.' From the wheat point of view, the problem is similar to that presented by Giant Ragweed in Manitoba.

For very light infestations, hand-pulling will pay good dividends.

Treatment with 2,4-D or MCP when the plant is small often reduces greatly the competition of this weed. It is a very difficult weed to completely eradicate by chemical application.



TARTARY BUCKWHEAT

GOOSEFOOT FAMILY

(*Chenopodiaceae*)

VARIOUS species of this family are widespread in North America and elsewhere. They are, for the most part, rather uninteresting to the casual observer because none of them has any petals. Consequently, the flowers are inconspicuous. There are only two really important species from the point of view of human use, and these are spinach and beets.

LAMB'S QUARTERS

(*Chenopodium album*)

The Latin name of this weed means 'white goosefoot.' The 'goosefoot' part has reference to the shape of the leaf, and it is presumably called white as a result of a white mealiness on the under surface. When the plants are young and tender, they are often used as spinach—a plant to which they are very closely related. Indeed, prairie dwellers who fail to make use of a vegetable which needs neither sowing (by man) nor weeding, deny themselves a tasty dish.

Undoubtedly, Lamb's Quarters cause substantial losses in cereal crops. The seeds live for a considerable time in the soil, and when conditions favour, even on land summer-fallowed the year before, grow with great vigour. They are so small they can readily be removed from cereal seeds. Fall and spring cultivation, including harrowing after the grain is well up, aid greatly in controlling this all too common weed.

Lamb's Quarters is readily controlled with 2,4-D. Early treatment is always more effective.



LAMB'S QUARTERS

SALTBUSH

(*Atriplex patula*)

THIS is a tall vigorous plant, as a rule, but sometimes more or less prostrate. It is a very variable species, not only in its habit of growth, but also in leaf shape. Indeed, botanists recognize two distinct varieties, one with broad triangular leaves, and another with quite narrow leaves. There are, also, many intermediate types (evolution in action!). As may readily be seen from the accompanying picture, Saltbush looks very much like Lamb's Quarters. The most obvious difference is concerned with the scarcity of leaves on the upper parts of Saltbush plants. Also, the Saltbush flowers are more clearly clustered on the flowering branches which often droop with the weight of the seeds.



SALTBUSH

The name Saltbush, was applied because this plant is a lover of salty or alkaline soils. It is also quite common along roadsides and on low-lying fertile ground. It is an annual and a heavy seed producer, but rarely, if ever, a serious weed. Cultivation or hoeing and hand pulling to prevent seed formation are the regularly recommended control practices.

No satisfactory information on the results of 2,4-D treatment on Saltbush is available.

SPEAR LEAF GOOSEFOOT

(*Monolepis Nuttalliana*)

THIS member of the Goosefoot family is humble and inconspicuous, but very common. Evolutionary processes have gone a long way with it because not only have the flowers no petals, but they have only one sepal. But for this sepal, which may aptly be termed a "fig leaf," the reproductive organs, pistil and stamens would be quite naked! The name *Monolepis* is derived from the Greek, meaning 'one scale.' The common name is quite descriptive, since the leaves are conspicuously spear-shaped. The plants are low, rarely over one foot in height, and much branched. Like Saltbush plants, they are fond of saline and alkaline soils.

Spear Leaf Goosefoot is native to Canada and common from Winnipeg to Grande Prairie. It is not, however, a serious weed.

Oak-Leaved Goosefoot (*Chenopodium glaucum*) is very similar in size and habit of growth to Spear Leaf Goosefoot; but the difference in leaf shape is sufficiently striking to render confusion quite unnecessary.

No satisfactory information on the effect of 2,4-D on this weed is available.



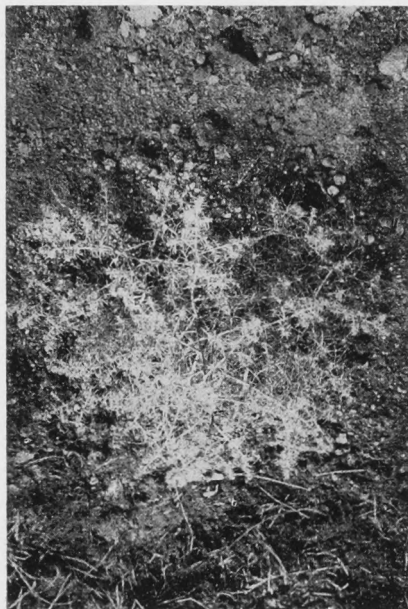
SPEAR LEAF GOOSEFOOT

RUSSIAN THISTLE

(*Salsola Kali* var. *tenuifolia*)

RUSSIAN Thistle is in some ways the most distinguished and most disreputable member of the family. It was introduced to the United States from Asia, and spread over the prairie provinces with astonishing rapidity. It does occur in eastern North America, but causes little concern. The plains region of the mid-west states and prairie provinces seems to offer ideal conditions for growth and multiplication. Indeed, Russian Thistle is a good example of a genuinely drought resistant plant. In hot, dry weather it remains green and succulent when the crop plants it robs are wilting or burning.

At maturity, Russian Thistle breaks off at the base and blows away, scattering seeds as it goes. Fall cultivation immediately after the binder or combine is recommended as many seeds are likely to be produced after the grain crop has been harvested.



RUSSIAN THISTLE

In fairness to a convicted criminal, we should remember that in very dry years Russian Thistle has sometimes been the only available feed. It has also served to check soil drifting when crops have failed completely due to drought.

Applying 2,4-D at fairly heavy rates, when the plant is small, has given fair to good control of Russian Thistle depending on growth conditions.

RUSSIAN PIGWEED

(*Axyris amarantoides*)

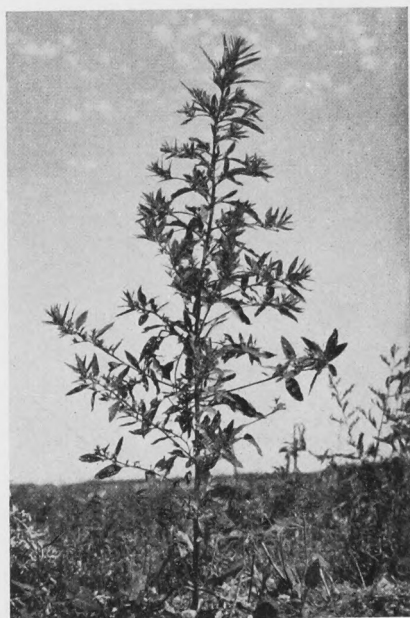
RUSSIAN Pigweed is an immigrant from Siberia, and has succeeded in establishing itself very firmly in Western Canada. The specific name *Amarantoides* was, undoubtedly, conferred upon it in recognition of its resemblance to certain species of the genus *Amaranthus* (see next page). It is a vigorous, tall-growing annual, and a very generous producer of seed. The plants are often four feet or more in height, and may be found in thick stands on fertile soil. Farmyards, gardens and roadsides are favourite surroundings though, according to "Weeds of Alberta," it is sometimes a serious weed in grain fields.

Plants on roadsides and in waste places should be destroyed before seeds can mature. Fall and spring cultivation, including harrowing after the grain is well up, are recommended practices.

Russian Pigweed is readily killed with 2,4-D during its early growth. It develops resistance to this chemical as it approaches maturity.

OTHER WEEDS IN THIS FAMILY

There are several weeds in the Goosefoot family of some importance which are necessarily omitted. Several species of *Chenopodium* are common and often troublesome. Strawberry Blite (*Chenopodium capitatum*), Bugseed (*Corispermum hyssopifolium*) and Summer Cypress (*Kochia scoparia*) are widespread in the West.



RUSSIAN PIGWEED

AMARANTH FAMILY

(*Amaranthaceae*)

THIS is another family without petals, very similar and closely related to the Goosefoot family. It has representatives nearly all over the world, though most species are found in the tropics. But for a few ornamentals, the Amaranth family includes no species of economic value.

PIGWEEED

(*Amaranthus retroflexus*)

A moderately tall, vigorous plant familiar to nearly everyone, it is often called Redroot for reasons obvious to all who have seen it. It is an annual which multiplies rapidly by means of seeds produced in great abundance. Pigweed is a native of tropical America; but has encountered no difficulty in adapting itself to regions anything but tropical.

Gardens, fence corners and row crops have a great appeal for

Pigweed. Indeed, it is one of the most troublesome of our garden weeds. It also grows well along the edges of grain crops, and if stands of grain are not fairly heavy and thick, Pigweed may cause considerable loss.



PIGWEEED

The seeds appear to germinate quite readily and can soon be 'grown out' of the soil. The removal of all plants from gardens in late summer and fall will save no end of work the next year.

Pigweed can be controlled with 2,4-D. A fairly heavy application of this chemical when the plant is small is recommended for its control.

PROSTRATE PIGWEED

(*Amaranthus blitoides*)

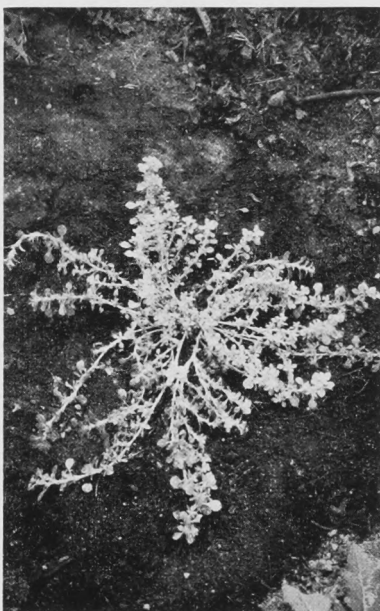
TO the inexperienced, this weed does not look much like the one on the last page. However, botanists maintain that both belong to the genus *Amaranthus*, and anyone who troubles to examine the flowers carefully will agree, despite the fact that Prostrate Pigweed has only three stamens per flower, while Pigweed boasts of five.

Prostrate Pigweed is native in the West. It is found chiefly in wayside places and waste ground. In Winnipeg it may often be seen growing in cracks in concrete sidewalks and along edges of parking lots. It is not a serious problem, though sometimes troublesome in gardens.

Tumble-Weed (*Amaranthus graecizans*) is a first cousin. It differs from Prostrate Pigweed in having smaller leaves and being much more upright in habit of growth. The 'lazy' habit of Prostrate Pigweed is apparent in the photograph. Tumble-Weed is usually bushy and much branched. When mature, it breaks off at the base and rolls about with the wind like Russian Thistle and Tumbling Mustard.

All three species of *Amaranthus* described in this bulletin like plenty of light and, as a result, are rarely troublesome in reasonably good stands of grain crops.

As Prostrate Pigweed is not a problem in grain fields, no information on its control with 2,4-D is available.



PROSTRATE PIGWEED

PURSLANE FAMILY

(*Portulacaceae*)

ASIDE from some very attractive ornamentals, the Purslane family includes no plants of apparent use to man. Most members are native to America.

PURSLANE

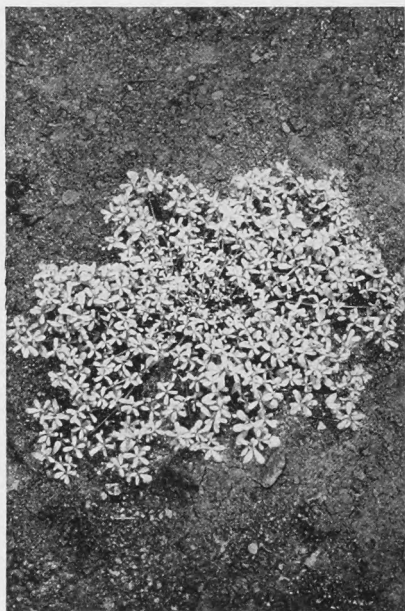
(*Portulaca oleracea*)

An annual, fleshy, prostrate weed which is sometimes confused with Annual Spurge. Aside from other differences which are really quite apparent, the two may be readily distinguished, since Annual Spurge has milky juice in stems and leaves, while Purslane has not. Purslane has yellow flowers which open only in more or less direct sunlight.

Purslane is a very troublesome weed in gardens and orchards. It cannot compete successfully with grain crops. Like other annuals which inhabit gardens, it can be controlled by preventing seed formation. Many of us begin to lose interest in the garden when the month of August arrives. Actually, if gardens were thoroughly weeded in August and September, there would be but little to worry about next spring. In the average farm and city vegetable garden, millions of seeds are shed in the autumn. Destroy garden weeds *before* they reproduce themselves.

After pulling or hoeing Purslane plants, it is wise to carry them off the field, since cut pieces may take root, and a plant pulled while in blossom may mature its seeds before dying.

Unfortunately this weed is a pest in gardens where it grows with plants that are susceptible to 2,4-D injury. When growing in crops resistant to 2,4-D, Purslane may be readily killed by spraying at fairly heavy rates.



PURSLANE

PINK FAMILY

(*Caryophyllaceae*)

HAD this family never been created, we would have been spared a lot of trouble with weeds, but we would have no carnations or sweet williams. It seems that all families must include poor relations and ne'er-do-wells.

The first artificial plant hybrid was made about 250 years ago between two species of the Pink family; namely, Carnation (*Dianthus caryophyllus*) and Sweet William (*Dianthus barbatus*).

The chickweeds, several species of which are small but attractive plants, also belong to the Pink family. One of them (*Stellaria media*) is a pest in gardens. Chickweed is quite resistant to 2,4-D. Heavy applications when the plant is small may retard its growth to some extent. Later treatment is quite ineffective.

CORN COCKLE

(*Agrostemma Githago*)

Corn Cockle, also known as Purple Cockle, is widespread in the prairie provinces, but is rarely found in sufficient abundance to cause trouble. It is a winter annual, and so apt to multiply where winter wheat is grown regularly. Unfortunately the petals had all fallen from the plant illustrated. They are purple and quite showy. Note the opposite leaves; that is, leaves in pairs with one member of each pair on opposite sides of the stem. This is a common arrangement in the Pink family.

Corn Cockle cannot be controlled with 2,4-D.



CORN COCKLE

NIGHT-FLOWERING CATCHFLY

(*Silene noctiflora*)

AN annual or winter annual with white, sometimes yellowish, flowers which open chiefly at night. The plants are vigorous, tall, much branched and covered with sticky hairs. Dr. Bird's photograph will serve as an adequate description of Night-Flowering Catchfly.

The photograph was taken in a field which was also infested with Bladder Campion. This field was being summerfallowed, and was a first-class example of what summerfallow should not be. A ten-minute excursion revealed the following weeds: Green Foxtail, Bladder Campion, Night-Flowering Catchfly, Blue Bur, Wild Oats, Sweet Clover, Wild Mustard, Stinkweed, Pepper Grass, Evening Primrose, Russian Thistle, Green Tansy Mustard, Grey Tansy Mustard, Biennial Wormwood, Fleabane, Wild Barley, Wild Buckwheat, Pigweed, Russian Pigweed, Lamb's Quarters, Couch Grass, Wolf Berry, Tumbling Mustard and Flixweed. Nearly all of these weeds were going to seed!

Night-Flowering Catchfly cannot be controlled with 2,4-D.



NIGHT-FLOWERING CATCHFLY

Photo by Dr. R. D. Bird

BLADDER CAMPION

(*Silene vulgaris*)

THE accompanying photograph of Bladder Champion will serve as an adequate description. It is only necessary to add that it is a very deep-rooted perennial, and produces enormous quantities of seed. Unfortunately the petals, which are white, had fallen when the photograph was taken.

According to Professor J. E. Howitt and Mr. J. D. MacLeod ("The Weeds of Ontario," Ontario Department of Agriculture, Bulletin 409), this is one of the worst weeds in Ontario. It is especially troublesome as an impurity in grass and clover seed.

Bladder Champion is already in Manitoba. It has also been found in Saskatchewan and Alberta. The importance of being on the lookout, and taking stern measures if any plants are noticed, cannot be stressed too strongly. We could have controlled Leafy Spurge cheaply twenty years ago. Now it costs, and will continue to cost, enormously.

Keep an eye open, and report any plants seen to your local District Agriculturist or Weed Inspector immediately.

Bladder Champion is unaffected even by heavy dosages of 2,4-D.



BLADDER CAMPION

Photo by Dr. R. D. Bird

COW COCKLE

(*Saponaria Vaccaria*)

COW Cockle is a very showy weed, and not likely to be confused with any other. It is native in Europe and Asia and introduced to this country.

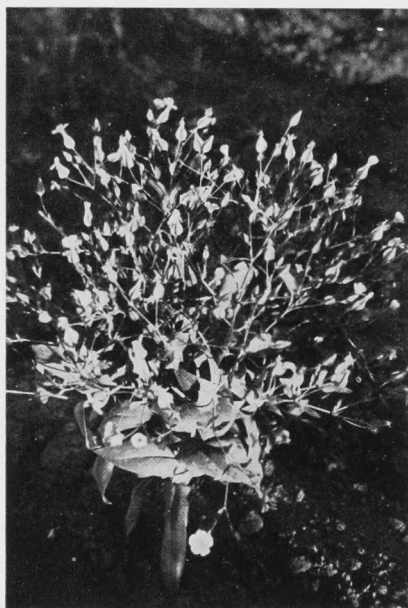
The flowers are pale pink and quite conspicuous. The upright habit and branching character are clearly shown in the photograph. Leaves, stems and calyx have a characteristic whitish-green colour.

Like Corn Cockle, this weed is very widespread on the prairies, but seldom very plentiful in any one place. Odd plants should be pulled, but if there are too many, standard methods for controlling annual weeds of secondary importance will apply.

The seeds of Cow Cockle, and also Corn Cockle, are poisonous to livestock.

WHITE COCKLE

(*Lychnis alba*)



COW COCKLE

White Cockle is a biennial or perennial, common and often troublesome. It is sometimes confused with Night-Flowering Catchfly. However, the latter has but three styles, while the former has five. This is the only justification for placing them in different genera (*Lychnis* and *Silene*). The styles are the small appendages borne on the summit of the ovary and on which the pollen grains fall and germinate. White Cockle is hairy, but not nearly so sticky as is Night-Flowering Catchfly.

Neither Cow Cockle nor White Cockle can be controlled with 2,4-D.

MUSTARD FAMILY

(*Cruciferae*)

CABBAGES, turnips, radishes, cauliflowers and Brussels sprouts all belong to the *Cruciferae* and, also, wallflowers, the beauty and smell of which make every Englishman homesick. These useful plants, however, have many weed cousins, of which fifteen are of sufficient importance in the prairie provinces to include in this bulletin.

The family name, *Cruciferae*, refers to the cruciform or cross-shaped appearance of the flowers which have, with few exceptions, four petals.

STINKWEED

(*Thlaspi arvense*)

Stinkweed is an annual or winter annual. It is widely distributed, and worthy (?) to rank among our important or serious weeds. In some districts it is worse than in others. Likewise, certain seasons seem particularly favourable for its development. Stinkweed is a prolific seed producer, and the seeds mature very early in the season. It is not unusual to find ripe plants towards the end of May. Its early maturity often enables it to mature a crop of seed before the farmer finds time to work summerfallow land. Fall and spring cultivation and early working of infested summerfallows will usually keep Stinkweed under control. In recent years 2,4-D and certain other chemical weed killers have given excellent control of Stinkweed in cereal and other tolerant growing crops.

Stinkweed is very easily controlled with 2,4-D in its early growth stages. Overwintered Stinkweed may be difficult to control and may require heavy dosages.



STINKWEED

HOARY CRESS

(*Lepidium Draba*)

MR. Herbert Groh has recently described three different Hoary Cresses in a paper published in *Scientific Agriculture* (vol. 20, page 750). The three species differ in leaf shape, pod shape and other minor characteristics. All three have been collected in western Canada. The name suggested for the one so well illustrated by Dr. Bird's photograph is Heart-Podded Hoary Cress. The other two are called Lens-Podded Hoary Cress and Globe-Podded Hoary Cress. There are no essential differences between the three in so far as control methods are concerned.

All three Hoary Cresses are perennials with very deep, branching roots. According to "Weeds of Alberta," two or three years are required to eradicate these weeds by cultivation. It is also stated that they are quite resistant to sodium chlorate. Heavy applications of 2,4-D may affect top growth of Hoary Cress to some extent. Eradication by 2,4-D, however, is not feasible.



HOARY CRESS

Photo by Dr. R. D. Bird

PEPPERGRASS

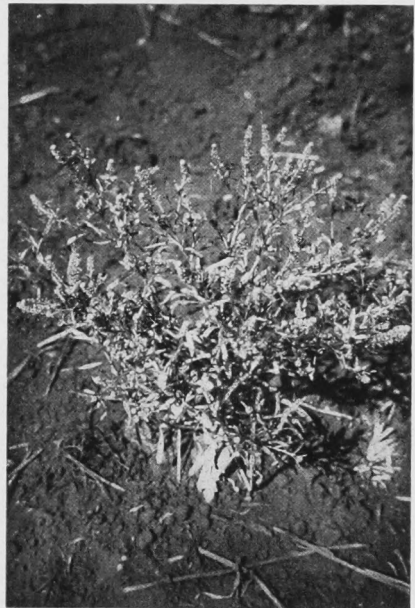
(*Lepidium densiflorum*)

THE name, *Lepidium*, is derived from a Greek word meaning "small scale," having reference to the small size of the pods of most species. It is an erect plant about one to two feet tall, and is usually without petals. In addition to losing its petals, this peculiar member of the *Cruciferae* has also lost four of its stamens! Most species of this family have six stamens, four long ones and two short ones; but Peppergrass has only two. The seed pods resemble those of Stinkweed quite closely, only they are much smaller and contain only two seeds, one in each 'wing.'

Peppergrass behaves as an annual or winter annual. The young plants form a rosette of leaves, while the adults are much branched and may reach a height of from eighteen inches to two feet. It is a common weed in grain fields and on summerfallow. According to "Weeds of Alberta," its seeds are often found as impurities in timothy and clover seed.

This weed is native in Europe and Asia, and was introduced to this country, where it is now firmly established. It is one of the many weeds which are rarely very serious in any one field, but which do a lot of damage, nevertheless. Good farmers get rid of it along with any or all others.

Peppergrass can be controlled with 2,4-D but requires fairly heavy rates of application of the chemical at early growth stages. It becomes quite resistant as it approaches maturity.



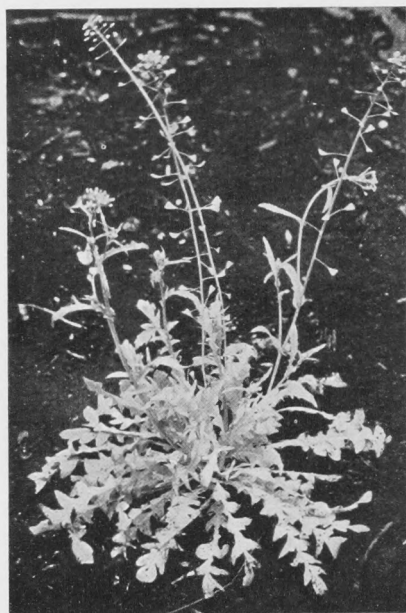
PEPPERGRASS

SHEPHERD'S PURSE

(*Capsella Bursa-pastoris*)

A NATIVE of Europe, Shepherd's Purse was introduced to North America where it has become very widespread. It behaves as an annual or winter annual. That is to say, seeds may germinate in the spring or summer and ripen a crop of new seed before freeze-up just as ordinary annuals do. Or, germination may take place in the autumn and small plants with a rosette of leaves develop. These small plants overwinter and begin growth in early spring, ripening in late May and June. Plants in almost any stage of development may be found throughout the summer.

Shepherd's Purse is a nuisance in lawns, gardens and sometimes in field crops. The plant is well illustrated in the photograph, and will be recognized without difficulty. The heart-shaped pods are quite typical and, doubtless, familiar to nearly everyone.



SHEPHERD'S PURSE

It is interesting to observe how the seed pods represent a sort of intermediate stage between Stinkweed and Peppergrass on one hand, and False Flax on the other. Mustards described after False Flax in this bulletin have very different pods.

Fall cultivation will destroy rosettes and prevent very early ripening the following summer. Thereafter, the routine cultural practices followed for annual weeds will afford effective control.

Shepherd's Purse can be controlled with 2,4-D. It requires fairly heavy dosages at early growth stages to give satisfactory results.

SMALL-SEEDED FALSE FLAX

(*Camelina microcarpa*)

THIS weed is remarkable in that it came to the prairie provinces with the early settlers and, though it has been here ever since, has not been a serious problem. It is to be found almost anywhere, but not often in abundance. The heart-shaped inflated pods are characteristic, and not easily confused with those of any other plant. A few years ago this Department was guilty of mistaking Hoary Alyssum (*Berteroa incana*) for a kind of False Flax, but was, fortunately, set right by Mr. Herbert Groh before the misinformation had time to spread! The pods of Hoary Alyssum are narrower than those of False Flax. They are, also, hairy while those of False Flax are smooth. The seeds differ quite distinctly, those of Hoary Alyssum being winged, while False Flax seeds are as illustrated in Plate II l.

Another species, Western False Flax (*Camelina sativa*), also occurs in the prairie provinces. Indeed, it is probably as common, if not more common, than the small-seeded species. It has larger seeds and pods.

Writing of the Athabaska-Peace River area in Alberta, Mr. Groh states: "Although winter annual in habit, False Flax, even in this predominantly spring wheat district, is becoming a serious problem. Without the utmost effort to prevent dispersal of the seed it will soon be much more widespread." (Dominion Dept. of Agriculture Tech. Bull. No. 7, 1937.)

As with all winter annuals, fall tillage is important.

Small-seeded False Flax is not easily controlled with 2,4-D. Fairly heavy rates applied when the plant is small usually gives good results. Late treatment is rarely successful.



SMALL-SEEDED FALSE FLAX

BALL MUSTARD

(*Neslia paniculata*)

THE common name of this weed is quite descriptive. The pods are more or less spherical in shape, and tend to remain intact even after passing through the threshing machine. Plate II *m* illustrates the pods which, as a rule, contain but one seed each. The Latin name, *paniculata*, is not really appropriate, since the flowers are not borne in panicles but in racemes. In paniculate plants, the flowers are borne on branches as, for example, in oats. In plants with racemes, the flowers are borne on little stalks (pedicels) which grow directly from the main flowering stem. The branches of Ball Mustard are of the plant itself, not just of the flower-bearing part, or inflorescence as it is called. Hence *Neslia racemosa* would really be a more appropriate name.

Ball Mustard is widespread and causes damage to crops, particularly in the park and wooded areas. It is probably the most common

Mustard, next to Stinkweed, in the Edmonton-Vermilion district. It is perhaps, surprising that this weed is not even more common because the pods are difficult to remove from seed wheat. It is an annual which may grow as a winter annual, and may be controlled by fall and spring tillage. If summer-fallowing is practised regularly and well done, Ball Mustard is not likely to be serious. *Use clean seed.*



BALL MUSTARD

Ball Mustard is easily controlled with 2,4-D. Lighter dosages may be used if the weed is treated during its early stages.

WILD MUSTARD

(*Brassica arvensis*)

IT is the genus *Brassica* to which turnips, cabbages and Brussels sprouts belong. Wild Mustard is one of the most troublesome annual weeds in Ontario. In the West, the worst infestations are to be found on the Regina plains and on the Portage plains. It is, however, by no means confined to these two areas, but is spreading rapidly in many other parts. It seems to have a definite preference for heavy clay soils.

This weed is an introduced annual. In the case of heavy infestations, an entire farm may be a veritable sea of yellow. Individual plants attain a height of from two to three feet. They are usually much branched and slightly hairy. The pods are smooth and tapering from near the base when mature. Those in the photograph are decidedly immature.

Many farmers claim that Wild Mustard has little, if any, effect on the yield of grain crops. This is rather difficult to believe, and should not be used as an excuse for neglect.

Prior to the advent of 2,4-D controlling Wild Mustard was a major problem. The seeds are rather difficult to remove from cereal crops and will live in the soil for many years. Wild Mustard is very readily killed with 2,4-D, particularly during its early growth stages. Because the seeds remain viable in the soil repeated annual applications of 2,4-D may be required to clean up an infested field.



WILD MUSTARD

HARE'S EAR MUSTARD

(*Conringia orientalis*)

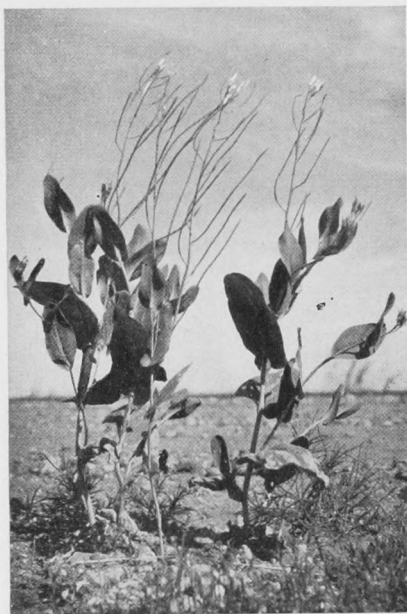
HARE'S Ear Mustard is very common and widespread, though heavy infestations are rare. It is quite a spectacular sort of weed with large, broad leaves and pods three inches or more in length. The leaves and stems are greyish-green in colour, and the flowers are pale yellow or white. It is not a native, but was introduced from Europe.

Since Hare's Ear Mustard does not require further consideration, the balance of this page may well be devoted to two weeds which may be confused with Wild Mustard.

Indian Mustard (*Brassica juncea*) is less serious in fields than is Wild Mustard, but it is a fairly common roadside weed. The plants are rather slender and almost hairless. The 'beaks' on the seed pods are shorter than those of Wild Mustard. The pedicels on which the pods are borne are more spreading and slender, and the leaves are somewhat narrower and less rounded at the ends.

Wild Radish (*Raphanus Raphinistrum*) has been observed here and there in western Canada. While there is no evidence that Wild Radish

has firmly established itself on the prairies, it is a weed worth watching. Wild Radish can be distinguished from Wild Mustard by its larger, paler flowers with purple veins, and by virtue of the fact that the pods break up into segments when ripe. Each segment contains one seed. Any appreciable quantity of Wild Radish in commercial wheat may result in the latter being graded 'rejected,' since the pod segments are very difficult to clean out.



HARE'S EAR MUSTARD

All of the above weeds can be controlled with 2,4-D, if treated early and at fairly heavy rates. As they approach maturity they develop considerable resistance to 2,4-D.

TUMBLING MUSTARD

(*Sisymbrium altissimum*)

WE have no less than five weeds belonging to the genus *Sisymbrium* sufficiently important to warrant consideration. Tumbling Mustard is very common and all too well known in the drier parts of the prairie provinces. It is partial to relatively light soils and, in southern Saskatchewan, usually makes way for Wild Mustard on the heavier soils.

According to "Weeds of Alberta," one plant of Tumbling Mustard may produce a million seeds! (Let Saskatchewan try to beat that.)

The plants are tall and much branched. The leaves are finely divided, and the flowers pale yellow. At maturity the plants break off at the base, and on the first windy day (for which prairie dwellers do not have to wait long) go bounding across the country, shedding seeds as they go. The farmer who grows Tumbling Mustard always generously shares the crop with his neighbours.

As a result of the ease with which Tumbling Mustard travels, control is clearly a community problem. An individual farmer can do but little by himself except surround his farm with a page wire fence.

Tumbling Mustard is quite easy to control with 2,4-D in the early growth stages. It develops some resistance to 2,4-D at later stages.



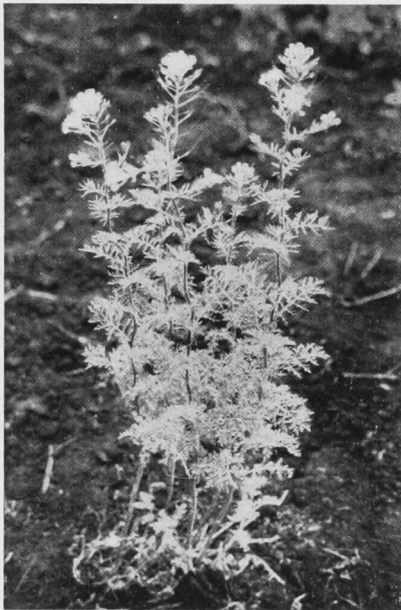
TUMBLING MUSTARD

FLIXWEED

(*Sisymbrium Sophia*)

FLIXWEED is perhaps the most common weed on the Canadian prairies. It is almost everywhere, and in plentiful abundance. It infests gardens, roadsides, grain fields, town-sites and anywhere that land has been cultivated or the native vegetation destroyed by other means.

Mature plants of Flixweed often reach a height of three feet or more. Seed is produced in such abundance that thick stands are very common. It commonly behaves as an annual, but is said to adopt a biennial mode of life sometimes. The leaves are finely divided and greyish-green in colour. The flowers are pale yellow. The seed pods are linear; that is, of equal thickness from end to end, and are one inch or more in length.



FLIXWEED

Flixweed is now so widespread that eradication is impossible. We must learn to live with it. Fall cultivation is important and spring cultivation essential. Flixweed will not compete successfully with a really vigorous crop. A good uniform stand of grain early in the season is an important factor in control.

The top growth of Flixweed can be controlled with 2,4-D, providing the plants are treated during early growth. Much of the competition with the growing crop can thus be eliminated.

GREEN TANSY MUSTARD

(*Sisymbrium incisum* var. *filipes*)

THE tansy mustards are so named because of the resemblance the leaves bear to those of Tansy (page 65). Green Tansy Mustard is widespread and common, and occasionally becomes moderately serious in grain fields. Many people who should know better persist in confusing Flixweed with Green Tansy Mustard. It is unfortunate that the accompanying photograph illustrates a plant in a more advanced stage of maturity than those of Flixweed illustrated on the last page. However, the distinction between the two is so definite that there need be no confusion. The seed pods of Green Tansy Mustard are cigar-shaped and *the pedicels are longer than the pod*. Flixweed pods are linear; that is, of equal thickness from end to end, and *the pedicels are shorter than the pods*. In addition, the leaves of Green Tansy Mustard are a darker green, those of Flixweed being definitely grey in colour.

Green Tansy Mustard is described as a biennial. That is to say, the plants remain in a rosette condition during the first season and mature the next. It would appear that it may also behave as an annual or winter annual. It is native in the prairie provinces and western states. Alberta weed authorities state that this weed is a serious menace in some districts.

This weed can be controlled with 2,4-D but should be treated during early growth stages. It becomes harder to kill as it approaches maturity.



GREEN TANSY MUSTARD

GREY TANSY MUSTARD

(*Sisymbrium incisum* var. *Hartwegianum*)

EVEN at the risk of adding to confusion, it is necessary to include a few remarks on Grey Tansy Mustard. It is a true biennial, and yet quite widely distributed even in grain fields. With biennials, there are two summers providing opportunities for destruction, yet Grey Tansy Mustard plants are common in cultivated fields.

The plants often reach a height of three feet or more. They are stout, branched from the base and well anchored with a stout branching root system.

Grey Tansy Mustard is later in maturing seed than either Green Tansy Mustard or Flixweed. Its leaves are less finely divided and more grey even than those of Flixweed. The seed pods are about one inch long and slightly tapered. The pedicels are shorter than the pods and both are rather erect, and remain quite close to the main

flowering stem. This last characteristic alone serves to separate Grey Tansy Mustard from the two preceding, both of which have widely spreading pods.

Thorough fall cultivation will control this weed because if first-year plants are regularly destroyed, none can ever mature seed.

The plant illustrated was just coming into flower when photographed, though nearby plants of Flixweed were dead ripe.

Both of the above weeds can be controlled with 2,4-D. Early treatment ensures success.



GREY TANSY MUSTARD

LOESEL'S MUSTARD

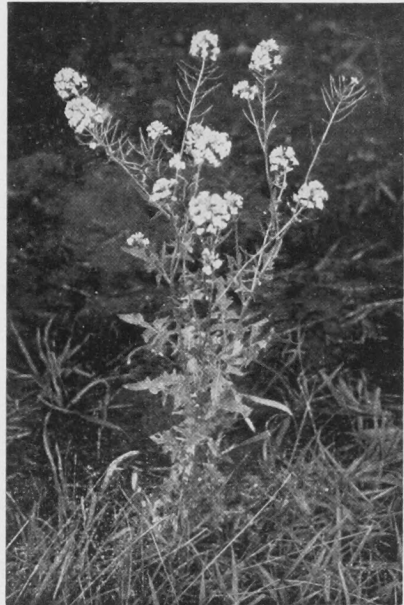
(*Sisymbrium Loeselii*)

AS may readily be seen from the photograph, Loesel's Mustard is very showy. It grows vigorously on roadsides, meadows and, also, cultivated fields. The plants are very vigorous, attaining a height of from three to five feet. The flowers are bright yellow and medium in size, and the pods resemble those of Flixweed. The leaves are deeply cut, and the terminal part is pointed and more or less triangular. Plants usually have hairy leaves and stems, though the upper parts of the plant are inclined to be smooth. The seeds (Plate III *e*) are very numerous and very small.

Loesel's Mustard was first collected in the prairie provinces in the year 1929 (Herbert Groh, Scientific Agriculture, vol. 13, page 725). Since it has been with us for so short a time, no one can say under what conditions it is most likely to thrive. Mr. Groh states that "there is no evidence as yet that this mustard is likely to be troublesome in fields. It has been in the United States, both east and west, for some years without occasioning alarm."

We must not forget, however, that a good many weeds (and men also!) have found the prairie province environment more to their liking than elsewhere. Loesel's Mustard should be watched closely. Farmers and others can render valuable service by sending suspected plants in for identification.

This weed has considerable resistance to 2,4-D but can be controlled by proper treatment. It is important to treat during the early growth stages.



LOESEL'S MUSTARD

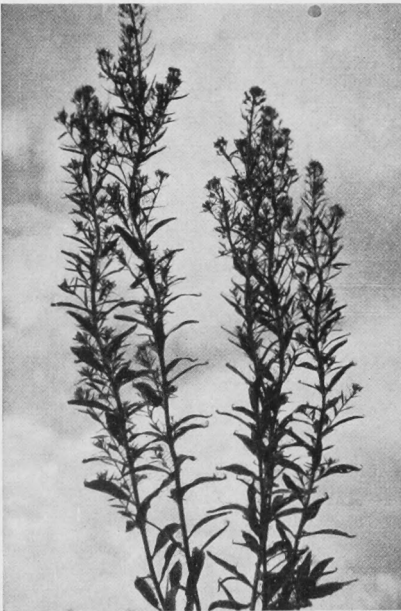
WORM-SEED MUSTARD

(*Erysimum cheiranthoides*)

THE genus *Erysimum* belongs to the same group in the family *Cruciferae* as do the genera *Conringia* and *Sisymbrium*. They resemble one another particularly with respect to the shape of the seed pods.

Worm-Seed Mustard is a native annual or winter annual. The flowers are small, yellow and very numerous. The pods are usually a trifle less than one inch in length. The leaves differ quite strikingly from any other member of the Mustard family illustrated in this bulletin. They are narrow with very short petioles (stalks) or none. The entire plant is roughish due to the presence of short branched hairs.

Worm-Seed Mustard is commonly found on light soils. It is more common as a roadside than as a field weed, though it is sometimes a pest. Mr. Groh describes it as "one of the worst of the native mustards" (Peace-Athabaska Weeds. Dominion Dept. of Agriculture Tech. Bull. No. 7).



WORM-SEED MUSTARD

If only a few plants are observed, they should be pulled. If the infestation is too heavy for hand-pulling, fall and spring tillage or summerfallowing will afford effective control.

This weed is easily controlled with 2,4-D. Heavier rates of application, however, are required as the plant approaches maturity.

DOG MUSTARD

(*Erucastrum gallicum*)

THIS is an appropriate weed with which to end our consideration of the Mustard family since, with the probable exception of Loesel's Mustard, it is the most recent immigrant to the prairie provinces. Dog Mustard was introduced from Europe and, while it has made but little headway in the eastern provinces and states, it promises to be very troublesome in the West. It occurs in all three prairie provinces.

The plants are annual or winter annual, often over two feet in height and much branched. The flowers are pale yellow. The basal leaves are very characteristic in shape, and may be identified almost with certainty by means of the photograph on this page. The seed pods are about one inch in length and slightly tapering.

Judging from infestations in parts of Manitoba, farmers would do well to be on the lookout for Dog Mustard. True, it is most common on roadsides which it sometimes occupies to the exclusion of other weeds. Nevertheless, it is capable of causing heavy losses in grain fields. Few farmers have had extensive experience with this weed, so no one knows just how persistent it may prove to be.

Dog Mustard can be controlled with 2,4-D. As with most weeds, the best kills are obtained by early applications of 2,4-D.



DOG MUSTARD

SPURGE FAMILY

(*Euphorbiaceae*)

THIS is a large family with many species. It is well represented in nearly all tropical regions of the world and, to a lesser degree, in temperate zones. We owe thanks to the *Euphorbiaceae* for rubber, tapioca, castor oil and a number of other substances of commercial use. The "crown of thorns" is said to have been a species of *Euphorbia*.

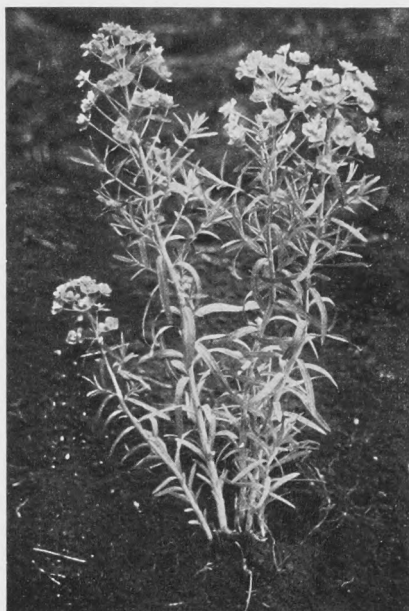
LEAFY SPURGE

(*Euphorbia Esula*)

Leafy Spurge is one of the worst perennial weeds we are obliged to fight. It is native to Europe, but finds the North American environment very congenial. It is a very persistent weed with deep tough roots and multiplies by means of seeds and rootstocks. The plants are rather pale green in colour and the flowers greenish-yellow. The flowers are borne in clusters, each cluster having the appearance of a single flower. Milky juice is a prominent feature of this weed.

If Leafy Spurge is caught in time, it may be eradicated quite cheaply by chemical means. If, however, the patches are large and numerous,

the cost of chemical treatment becomes prohibitive, and it is necessary to resort to black summerfallow. Two years or more of black summerfallow are usually required. For detailed information on control methods, Provincial Departments of Agriculture or Dominion Experimental Farms should be consulted.



LEAFY SPURGE

Cypress Spurge (*Euphorbia Cyparissias*) also occurs in the prairie provinces. The leaves are narrower and more crowded. It often grows in cemeteries, but we cannot be sure that it will remain content in an environment so depressing.

Leafy Spurge cannot be controlled with 2,4-D. Heavy applications will burn the top growth and set the plant back somewhat. Eradication is rarely achieved even with repeated heavy applications.

CASHEW FAMILY

(*Anacardiaceae*)

A FAMILY of trees and shrubs. The ornamental sumachs belong to this family. Other useful members are: Japanese lacquer tree, Burmese lacquer tree, pistachio nuts and cashew nuts.

POISON IVY

(*Rhus Toxicodendron*)

Poison Ivy is a woody perennial shrub which multiplies by means of seeds and creeping rootstocks. In the prairie provinces it is usually not over twelve to eighteen inches in height, though in the eastern provinces and in British Columbia a climbing variety is common. The leaves are smooth, at least on the upper surfaces, and the berries are usually creamy-white in colour.

While not a field weed, Poison Ivy is a plant with which everyone should be familiar. It secretes an oily substance which is very poisonous to many people. Susceptible persons need only touch a plant to be afflicted with painful irritations for many weeks. Since this plant is largely confined to the margins of woods, eradication is difficult. It abounds on golf courses, summer resorts, pastures and waste land.

When possible, all plants where children are likely to be, should be rooted out. Spraying with a solution of sodium chlorate will afford effective control, though at least two applications are usually necessary. If hand-pulling is undertaken, rubber boots and gloves should be worn, and all clothing thoroughly washed when the job has been completed.

Repeated applications of 2,4-D at fairly heavy rates will take care of this troublesome pest.



POISON IVY

PARSLEY FAMILY

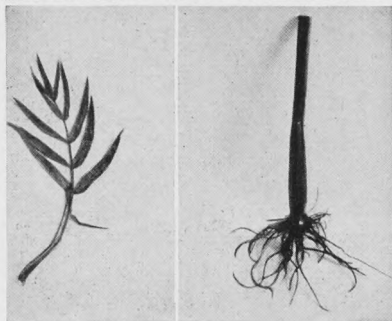
(*Umbelliferae*)

MANY plants of food value such as carrot, parsnip, celery and parsley belong to this family. It also contains many weeds, some of which are very poisonous. The small white flowers are arranged in groups called an umbel (an umbrella-like head or cluster) and suggests the name, *Umbelliferae*, literally meaning 'umbel-bearing.' Two members of the Parsley family, namely, Water Hemlock and Water Parsnip, are quite familiar to prairie dwellers and deserve a place in this bulletin.

WATER PARSNIP

(*Sium cicutaefolium*)

A tall, leafy, perennial herb with many small white flowers arranged in flat-topped clusters. This species is found in sloughs, wet ditches and other wet places. Water Parsnip is generally considered a harmless plant but it is likely to be confused with Water Hemlock which is very poisonous. This is the justification for including it in this bulletin.



WATER PARSNIP

Every prairie dweller should be able to tell the difference between Water Parsnip and Water Hemlock (see next page). This is made easy by the accompanying photographs. Each leaf of Water Parsnip has from 3 to 8 pairs of long, narrow, lance-shaped leaflets. The compound leaves of Water Hemlock, on the other hand, are made up of rather broad, sharply toothed leaflets. The two species may be easily distinguished by means of root characters. Water Parsnip has numerous fibrous roots, but no thick, fleshy ones, as found in Water Hemlock. Considerable doubt still exists as to the poisonous nature of Water Parsnip. Consequently, all pastures should be rid of this plant. Pull and grub out all plants, especially in the early spring. Cut or mow all growing plants before the seeds form.

No information is available on the effect of 2,4-D on this weed.

WATER HEMLOCK

(*Cicuta maculata*)

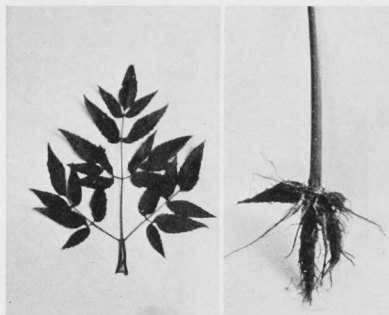
WATER Hemlock is very poisonous. Cases of livestock poisoning are reported from time to time and would probably be much more common were it not for the fact that the plants have a very bitter taste and are not relished by animals.

Water Hemlock is a tall, branched, and leafy perennial herb, with many small, white flowers in flat-topped clusters. It is found in sloughs and wet places in all three prairie provinces. Water Hemlock may be confused with Water Parsnip, a relatively harmless plant, but with a little care and with the help of the accompanying illustrations, anyone should be able to tell the difference.

Three characteristics serve to identify Water Hemlock with ease and certainty: (1) the compound leaves are made up of numerous sharp-toothed leaflets; (2) the vein branches in the leaflets terminate in the notches between the teeth, not in the tips of the teeth; (3) Water Hemlock has several thick, fleshy, poisonous roots, just underground, about the size and shape of a man's little finger.

Getting rid of Water Hemlock is the surest way of preventing the poisoning of animals. To keep the plants from spreading, cut or mow the tops before the seeds form. Water Hemlock in pastures should be pulled and burned, especially if feed supplies are running low and the stock generally hungry. The moment a farmer suspects his animals have been poisoned by Water Hemlock he should call a veterinarian, place the animal where adequate care and treatment can be given, and offer it only feed that is known to be safe.

No satisfactory information on the effects of 2,4-D or other herbicides on Water Hemlock is available.



WATER HEMLOCK

MALLOW FAMILY

(*Malvaceae*)

A WORLD without the *Malvaceae* would be a world without cotton or hollyhocks. The family includes, also, quite a number of ornamentals.

ROUND-LEAVED MALLOW

(*Malva rotundifolia*)

Round-Leaved Mallow is an introduced biennial, according to most authorities. There is some evidence, however, that it may also behave as an annual. Plants are usually much branched, and the lower branches tend to spread out on the ground. The flowers are inconspicuous with whitish petals, and are borne in the axils of the leaves. This weed is not likely to be confused with any other, though there are one or two somewhat similar ornamental species which occasionally escape from cultivation. The leaves of Round-Leaved Mallow are, as

might be expected, round and have wavy edges. The accompanying illustration represents a typical plant.



ROUND-LEAVED MALLOW

Round-Leaved Mallow is seldom troublesome in grain fields, but is all too common in gardens and along fences and roadsides. Plants should be destroyed before the seeds can mature. If weeding in the garden has been delayed too long, the plants should be pulled, carried off and burned.

Heavy applications of 2,4-D at early growth stages may reduce the infestation. Complete control of this weed with 2,4-D is difficult to achieve.

MILKWEED FAMILY

(*Asclepiadaceae*)

THIS is a family of perennial herbs and shrubs, members of which are common in warm climates, particularly South Africa. The leaves and stems are well supplied with milky juice.

MILKWEEDS

(*Asclepias* spp.)

Several species of the genus *Asclepias* are native to the Canadian prairies. The one illustrated here is Common Milkweed (*Asclepias syriaca*). It is the most common species in the prairie provinces, particularly in Manitoba. The plants are vigorous and tall often attaining a height of from four feet or more. The flowers vary from pale purple to whitish. Another species, Showy Milkweed (*A. speciosa*) is also found on the prairies. It is somewhat similar to Common Milkweed, but the leaves and flowers are larger, the plants more hairy, and the flowers purple.

Both species are perennials with underground creeping rootstocks, but neither is a serious field weed in the prairie provinces. Common Milkweed is sometimes quite troublesome in crops in the province of Ontario.

The flowers are borne in clusters known as 'umbels.' The prominent parts of the flowers (see photograph) are not petals, as they appear to be, but constitute what is called a 'corona.' The function and evolutionary origin of the corona are unknown. The large cup-shaped structure on daffodils is also a corona, and is equally puzzling to the student of plant evolution. This does not, of course, indicate a relationship between daffodils and milkweeds because they are almost "as far apart as the poles."

The Milkweeds unfortunately cannot be controlled with 2,4-D.



MILKWEED

CONVOLVULUS FAMILY

(*Convolvulaceae*)

IN introducing this family, it may be helpful to note that it is closely related to the potato family. The resemblance between the flowers of Morning Glory and those of potatoes and *Nicotiana* (tobacco), both of which belong to the potato family, is quite obvious. We have now, in this bulletin, arrived at an important stage in the evolution of seed plants, in that the petals are united into a sort of tube or bell. Actually, we reached this stage with Milkweed, but it was not very apparent because of the 'queer' structure of Milkweed flowers.

The most distinguished and useful member of the *Convolvulaceae* is the Sweet Potato.

WILD MORNING GLORY

(*Convolvulus sepium*)

This is a native twining or creeping perennial with large showy pink or white flowers. It commonly grows in moderately moist places, particularly at the edges of woods and along the banks of streams and rivers.



WILD MORNING GLORY

Two large bracts will be found at the base of the flower, indeed they may be seen in the accompanying photograph. The size and position of these bracts alone will serve to distinguish between Wild Morning Glory and Field Bindweed.

Wild Morning Glory occasionally becomes a serious field weed. Once it appears in grain fields, drastic steps should be taken to eliminate it. Small patches may be killed with sodium chlorate. If the infestation becomes too widespread for chemical control, black summerfallow, probably for two years, may be necessary.

Heavy applications of 2,4-D, when the plant is small, usually sets the plant back severely. Repeated applications are usually required to effect eradication.

FIELD BINDWEED

(*Convolvulus arvensis*)

FIELD Bindweed is very similar to Wild Morning Glory in habit of growth and in appearance. There is, however, no excuse for confusing the two. Instead of having two large bracts at the base of the flower, Field Bindweed has two very small ones about half way down the pedicel (flower stalk). Then, the flowers of Field Bindweed are somewhat smaller than those of Wild Morning Glory. The photographs on this page and the last were taken at the same distance, so they illustrate the relative sizes of the flowers.

Field Bindweed is an introduced perennial with deep, persistent, creeping rootstocks. It is one of the worst weeds in grain fields of the United States. It has come to the Canadian prairies as an impurity in various garden and vegetable seeds, and is already well established in all too many areas.

The most important means of control is prevention. If farmers could recognize Field Bindweed as soon as it appeared, and were fully conscious of the probability of future trouble, the battle would be almost won. Unfortunately, infestations are often not reported until substantial areas are involved. Small areas can be eradicated economically with sodium chlorate solution. Eradication by tillage methods is wearisome and expensive. Detailed advice concerning control may be secured from Provincial Departments of Agriculture.

Field Bindweed can be controlled with 2,4-D by treating at fairly heavy rates when the plants are small. However, repeated applications of 2,4-D at heavy rates are required for its eradication.



FIELD BINDWEED

BORAGE FAMILY

(*Boraginaceae*)

A FAMILY of herbs, shrubs and trees, well represented in the prairie provinces, but by herbaceous species only. Quite a number of ornamentals belong to the Borage family, the best known being forget-me-nots (*Myosotis* spp.).

BLUE BUR

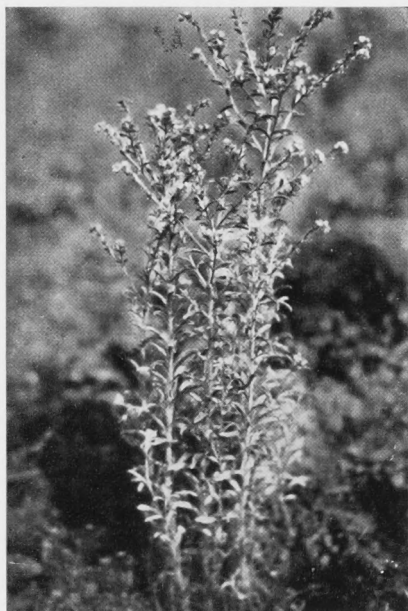
(*Lappula echinata*)

Blue Bur is a fairly tall, rough-hairy plant with small but attractive blue flowers. Introduced from Europe, it has become widespread in Canada and may well be considered a serious weed in the prairie provinces. Besides causing reduced yields of grain crops, Blue Bur is a menace to sheep because the numerous seeds become hopelessly entangled in their wool. Blue Bur is not, as a rule, difficult to control.

Heavy infestations are a reliable indication of haphazard farming. Fall and spring tillage well done plus occasional summer-fallowing will virtually eliminate this weed.

A first cousin to Blue Bur glories in the name *Lappula Redowskii* var. *occidentalis*. It is fairly common along roadsides and abandoned fields. This plant differs from Blue Bur chiefly in having very pale blue, almost white flowers, and only one row of spines on the seed margins. Blue Bur has two rows (Plate III*n*).

Blue Bur is readily controlled with 2,4-D. Early treatment requires less chemical and is usually more effective.



BLUE BUR

MINT FAMILY

(*Labiatae*)

THIS is a large family of aromatic or strongly scented plants. It is of interest, particularly to the ladies, because it comprises such plants as Lavender, Rosemary, Mint, Sage, Peppermint, Thyme, and many others, which are used in cooking or in the manufacture of perfume. The family contains several weeds, one of which is given recognition in this bulletin.

AMERICAN DRAGONHEAD

(*Dracocephalum parviflorum*)

American Dragonhead is a native annual or biennial weed which is quite common in the prairie provinces. In southern Manitoba it is commonly found in grain fields and waste places on gravelly soils and hillsides. It is a vigorous tall-growing plant with square stems and opposite, simple leaves. The flowers are clustered in the axils of the leaves. When bruised, the stem gives off a strong scent. The seed is a dark brown nutlet about one-eighth of an inch long, egg-shaped, about twice as long as wide, and bears, on its angular side, a kidney-shaped basal scar. This prominent scar has a slit in the middle which gives it the appearance of a mouth. The seeds are often found in wheat screenings, and occur occasionally in grass and clover seed. Plants in waste places should be mowed before seeds are formed. American Dragonhead is not a troublesome weed on well cultivated land.

No satisfactory information on the control of this weed with 2,4-D, or other selective chemicals, is available at the present time.



AMERICAN DRAGONHEAD

FIGWORT FAMILY

(*Scrophulariaceae*)

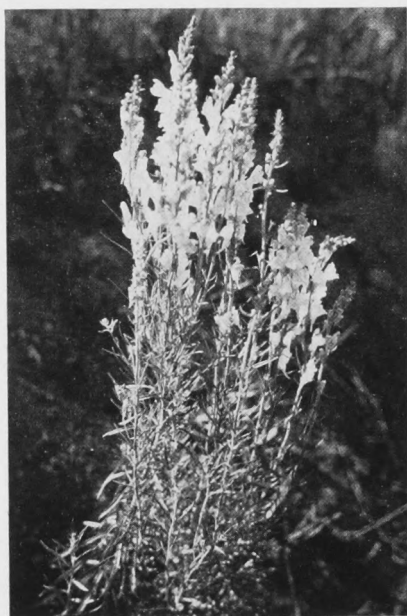
THIS family brings us to another interesting advance in plant evolution. The flowers of most members are not completely symmetrical. Snapdragons will serve as very obvious illustrations. This characteristic has appeared independently in other more primitive families, as, for example, the Buttercup family which includes the genus *Delphinium* with its 'zygomorphic' flowers. Another prominent example is the pansy.

TOADFLAX

(*Linaria vulgaris*)

Toadflax resembles the snapdragon in general appearance and, indeed, the two are very closely related. Another introduced weed, Toadflax is a persistent creeping rooted perennial which, under favourable conditions, will crowd out crops and even native grasses. It has narrow leaves and bright yellow showy flowers. It is often confused with a harmless species frequently grown in gardens. The garden

Toadflax is usually taller and has broad short leaves. The leaves are so different that the two may readily be distinguished.



TOADFLAX

Toadflax is spreading rapidly in parts of Alberta, particularly between Olds and Edmonton and between Calgary and Banff. It is so easily recognized that there is no excuse for allowing it to become established. Small patches may be destroyed with sodium chlorate, but summer-fallowing is necessary for larger areas. According to "Weeds of Alberta," cultivation should commence early in June, and the first operation should be deep plowing.

Toadflax cannot be controlled with 2,4-D. Only a slight burning usually follows the application of even heavy dosages.

PLANTAIN FAMILY

(*Plantaginaceae*)

FROM the point of view of the total number of species, this is a small and relatively unimportant family. However, some species are so widespread and abundant that the family is anything but inconspicuous. With few exceptions, the plants are stemless with flowers born on spikes.

BROAD-LEAVED PLANTAIN

(*Plantago major*)

Chiefly a weed of lawns, gardens, golf courses and wayside places, Broad-Leaved Plantain is more of a problem to the town or city dweller than to the farmer. It is a native perennial second only to the Dandelion as a lawn weed. The leaves are broadly oval with parallel veins and usually somewhat hairy and rough. The flowerstalks or 'scapes', as they are called are from six inches to a foot or more in height and produce large quantities of seed. The roots are fibrous and deep.

Broad-Leaved Plantain is never troublesome in cultivated fields. It can be effectively controlled in lawns, meadows, and gardens with fairly heavy applications of 2,4-D.

Other species of the genus *Plantago*, as well as *P. major*, are troublesome lawn weeds in British Columbia, eastern Canada and in many other countries.



BROAD-LEAVED PLANTAIN

COMPOSITE FAMILY

(*Compositae*)

THE Composite family undoubtedly represents the maximum achievement in the evolution of seed plants. It is made up chiefly of herbs and shrubs with a few trees and climbers. The flowers are crowded into heads, and what is often incorrectly called a flower is really a head of several or many flowers. In most species there are two kinds of flowers on the same head: ray flowers around the outside and tubular flowers in the centre. Commonly, the ray flowers are sterile and the tubular flowers fertile. Some species have tubular flowers only (Bachelor's Button, Russian Knapweed, etc.), and others have exclusively ray flowers (Sow Thistle, Dandelion, etc.). The petals are united into a tube in tubular flowers and a sort of strap in ray or "ligulate" flowers. The calyx (sepals) is either absent or greatly modified. It consists, when present, of bristles, hairs, scales or awns. The "parachute" of seeds of thistles, dandelions, etc., is a modified calyx. A single flower produces but one seed. The family is world-wide in its distribution, and there are hundreds of different species in the prairie provinces. Fraser and Russell have recorded 248 species in Saskatchewan alone. (List of the flowering plants, ferns and fern allies of Saskatchewan.)

GUMWEED

(*Grindelia squarrosa*)



GUMWEED

Gumweed is a rather coarse rough plant with bright yellow ray and tubular flowers. It is perennial or biennial. The foliage secretes a sticky substance which is particularly apparent on the 'involucre' (bracts surrounding the head often mistaken for calyx). Thick stands of this weed have been observed in cultivated fields in the prairie provinces. It is, however, chiefly a weed of roadsides and meadows, and is partial to saline soils.

Gumweed can be controlled with 2,4-D. Where pastures are infested fairly heavy rates of 2,4-D are needed for effective control.

CANADA FLEABANE

(*Erigeron canadensis*)

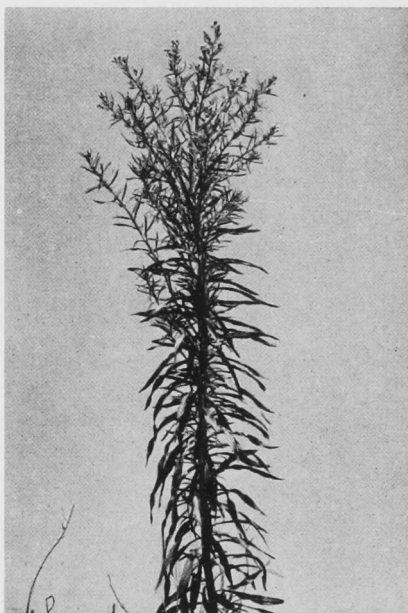
THE fleabanes, of which there are several species native in the prairie provinces, are first cousins to the asters. Many of our native fleabanes and asters have quite showy heads with white or purple ray flowers, and are often called daisies.

Canada Fleabane is a native annual. It is widely distributed and common, particularly on relatively light soils. The plants are tall, often reaching a height of four feet or more, very leafy and somewhat bristly hairy. The heads are very numerous on the much branched upper part of the plant. Individual heads, which may be distinguished in the photograph, are very small, but each one has many flowers. The ray flowers are white and the tubular ones yellow.

Seeds of Canada Fleabane are illustrated in Plate IV c. The bristly pappus (corresponding to the calyx of other seed plant families) is apparent.

Canada Fleabane is an annoying and unsightly weed, but seldom becomes a real pest. Routine measures adopted for minor annual weeds will control it effectively. It is, by the way, often called Horse Weed; but there is little evidence that horses are partial to it. On the other hand, there is but little evidence that it is really a 'bane' to fleas!

No satisfactory information is available as to the effect of 2,4-D on Canada Fleabane.



CANADA FLEABANE

POVERTY WEED

(*Iva axillaris*)

THE genus *Iva* is characterized by small heads without ray flowers. Poverty weed is a coarse, rough native perennial with creeping rootstocks. The plants are dark green in colour, and usually rather rough and hairy. The leaves on the lower part of the stem are opposite, but alternate on the upper part. The drooping heads are small, greenish yellow in colour and borne in the axils of the upper leaves.

Poverty Weed is a problem chiefly in heavy soils inclined to be saline, and is particularly troublesome on irrigated land. According to "Weeds of Alberta," it is doubtful if the plant ever multiplies by seed, though seeds are certainly produced (Plate IV *d*). Muenscher ("Weeds"), on the other hand, recommends mowing to prevent seed formation. This difference of opinion, on a subject which should not be a matter of opinion, illustrates the need for more investigational

work on the reproduction of weed plants. There is still much to be learned about conditions favourable or otherwise to the germination of seeds of many different weeds. Information on this subject is of great importance in relation to tillage practices.

Summerfallowing or the use of intertilled crops aid in controlling Poverty Weed. Under irrigation, alfalfa will keep it in check, but will not eradicate it.

Eradication of Poverty Weed with 2,4-D is difficult. Usually the top growth is killed but regrowth occurs from the roots.



POVERTY WEED

FALSE RAGWEED

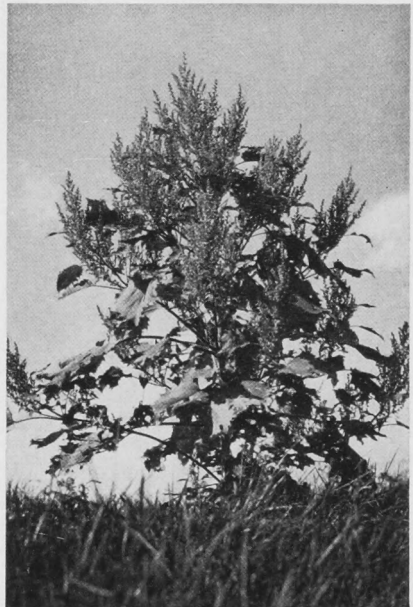
(*Iva xanthifolia*)

FALSE Ragweed is one of the most vigorous and conspicuous of our annual weeds. Under favourable conditions the plants often exceed five feet in height. Before the flowers appear, it is easy to confuse it with the common annual sunflower. The leaves of False Ragweed are, as a rule, opposite while those of the sunflower are alternate. Of course, when the flowering heads appear, the distinction between the two is clear.

The heads of False Ragweed are very small and crowded. There are many hundreds of them on the plant illustrated here. Each one bears five fertile flowers and several sterile ones. Like those of its cousin Poverty Weed, the heads of False Ragweed are drooping.

This is not a serious field weed, but it is very unsightly. Some cases of grain being crowded out by False Ragweed have been reported. Spring cultivation, including harrowing after the grain is up, will aid in controlling this weed. The edges of infested fields should be mowed before seed can mature.

False Ragweed is easily controlled by 2,4-D treatment. It is best to treat early.



FALSE RAGWEED

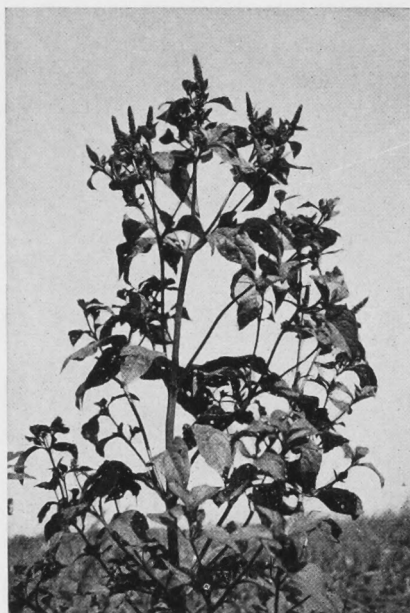
GREAT RAGWEED

(*Ambrosia trifida*)

GREAT Ragweed is a very vigorous native annual. The leaves are opposite, rough-hairy and each leaf has three lobes. According to "Gray's New Manual of Botany," plants may reach a height of nearly twenty feet! Fortunately, in Manitoba, they seldom exceed six feet in height.

The flowers are 'monoecious.' That is to say, the male and female flowers are borne on different parts of the same plant. The male (staminate) flowers are found in heads crowded on racemes at the top of the plant (see photograph). The female (pistillate) flowers are borne, one per head, in the axils of the upper leaves.

Great Ragweed owes its importance chiefly to the fact that it is almost impossible to clean the seeds out of wheat. As a result, commercial wheat containing appreciable quantities of Great Ragweed seed is graded 'rejected.' It also causes serious reductions in yield under some conditions.



GREAT RAGWEED

While Great Ragweed is at present chiefly a Manitoba problem, it occurs in Saskatchewan and is likely to increase. It thrives on headlands, along fence lines and in road ditches, all of which should be seeded down to grass in infested districts. Eradication can be effected by well managed summerfallowing if seed is prevented from spreading in from roadsides or elsewhere.

Great Ragweed can be controlled with 2,4-D. Early treatment gives best results.

PERENNIAL RAGWEED

(*Ambrosia coronopifolia*)

PERENNIAL Ragweed is closely related to Great Ragweed, and resembles it chiefly in the flowers and seeds. The similarity between the positions of the heads bearing staminate flowers is quite apparent from the photographs. The seeds (Plate IV *g*) differ from those of Great Ragweed in being smaller and less sharply angled. The plant is a native perennial with an extensive system of creeping rootstocks, but is not a serious field weed. The height varies greatly, but in the prairie provinces is not often over two feet.

Common Ragweed (*Ambrosia elatior*) resembles Perennial Ragweed quite closely. It is a very variable species, and some plants are so similar to the perennial species that the presence or absence of creeping rootstocks is the surest means of distinction. Common Ragweed is a native annual with a simple tap root.

In the province of Ontario, Common Ragweed is regarded as a serious weed in fields of grain and other crops. It makes good progress after harvest, so autumn cultivation is an important feature of control. The growth on roadsides and headlands should be cut regularly throughout the summer.

The three species of *Ambrosia* mentioned are among the most common causes of hay fever.

All of the Ragweeds can be controlled by proper applications of 2,4-D.



PERENNIAL RAGWEED

COCKLEBUR

(*Xanthium canadense*)

COCKLEBUR is a coarse native annual with rough-hairy stems and leaves. The leaves are often inclined to be 3-lobed. The flowers of Cocklebur are monoecious, with the several-flowered staminate heads on short terminal spikes. The pistillate flowers occur two in each head, with the heads clustered in leaf axils. The mature fruit consists of a spiny bur which contains two seeds, one in a lower and one in an upper position. It is interesting to note in passing that the lower seed germinates first, while the upper one often remains dormant for months or, not infrequently, for years.

Cocklebur is seldom very troublesome in grain fields. However, it is an unsightly plant, and may multiply rapidly along roads and on waste lands. The burs are a common cause of degraded wool,

and so the weed should be eradicated from places where sheep are likely to graze. Also, the seedlings are said to be poisonous to livestock, especially swine.



COCKLEBUR

Once an infestation becomes established, eradication is difficult because, as stated above, some seeds often remain dormant for years. Hand pulling, hoeing, mowing and spring harrowing, especially after the grain is well up, are generally recommended practices.

Cocklebur can be controlled with 2,4-D at medium rates of application.

TANSY

(*Tanacetum vulgare*)

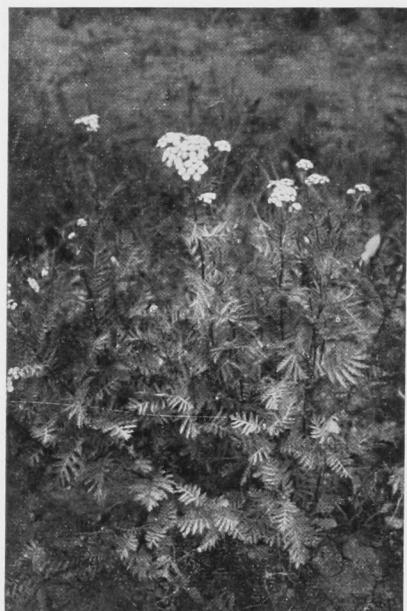
TANSY is an introduced perennial, escaped from cultivation and quite widely distributed on the prairies. It is not an important weed and rarely, if ever, damaging to crops. The only justification for including it in this bulletin is concerned with the fact that specimens are often sent in for identification.

The family *Compositae* is so large and variable that botanists have found it convenient to separate its members into different 'tribes.' One tribe, the *Anthemideae*, is largely made up of strongly scented herbs and shrubs. To this tribe belong yarrow, the sage brushes, chrysanthemums, Wormwood (see next page), Tansy and others. Of course, these plants possess other characteristics in common, also.

Tansy is quite a showy plant with bright yellow heads crowded at the tops of the stems. The flowers are all tubular, though the marginal ones have a slight tendency to become ligulate or strap-shaped.

Once established, Tansy becomes quite persistent on roadsides and elsewhere. The plants are equipped with tough perennial rootstocks.

Early treatment with 2,4-D at fairly heavy rates will effectively control this weed.



TANSY

WORMWOOD

(*Artemisia biennis*)

IT is to the genus *Artemisia* that the sage brushes and Prairie Sage belong. The latter is familiar to all prairie dwellers due to its abundance in over-grazed pastures, of which it sometimes almost takes possession. It grows in clumps, is grey in colour, has small finely divided leaves and is very strongly scented.

Wormwood is a native biennial or, sometimes, annual. The accompanying photograph is not really typical, since the plants ordinarily branch but little. Like other species of *Artemisia*, Wormwood is scented. The leaves are finely divided and dark green in colour. The stems are stout and tall, sometimes reaching a height of five or six feet. Unlike most other species of the genus, this one is quite smooth and hairless. The heads are very small and are clustered on short spikes which are borne in the leaf axils. They contain tubular flowers only.



WORMWOOD

This weed is of common occurrence throughout the settled regions of the prairie provinces. It thrives on relatively low-lying cultivated ground, and undoubtedly reduces the yields of grain crops. Since seeds are produced in great abundance, patches should be cut before the plants are ripe. Fall cultivation will destroy biennial plants which, if left undisturbed, will grow vigorously the next year. Heavy stands of this weed are often found where the ground was too wet for spring tillage.

Wormwood can be controlled with 2,4-D if it is treated early at fairly heavy rates. It gets increasingly hard to kill as time goes on.

BURDOCK

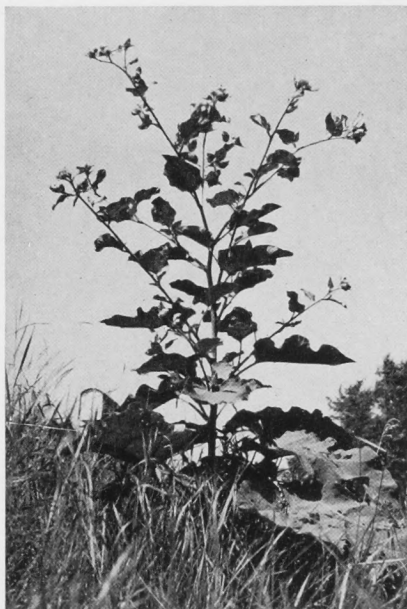
(*Arctium minus*)

BURDOCK is a very vigorous introduced biennial. During the first year of growth, a large tap root and a rosette of sometimes enormous leaves develop. The year following, a tall coarse branching stem, often over six feet in height, is produced. The large basal leaves bear a superficial resemblance to those of rhubarb, but they differ somewhat in shape, and the lower surfaces are covered with a dense woolly coating of hair. The heads are purple in colour or rarely white, and are usually rather less than one inch in diameter. They contain tubular flowers only. The 'involucre' (bracts surrounding base of head) is very spiny and is damaging to the wool of sheep.

The plants are usually found growing on rich soil along roads, fences and in pastures. They sometimes multiply quite rapidly. Small first-year plants should be destroyed by hoeing when cultivation is not possible, and larger ones should be cut several inches below the surface or new shoots will develop from the root. Second-year plants should be destroyed before any seeds can mature.

Burdock is widespread in the prairie provinces. Since it is coarse and unsightly and a menace to sheep, it should be eradicated.

To ensure control, Burdock should be treated with 2,4-D while in the early growth stages. A fairly heavy rate of application should be used.



BURDOCK

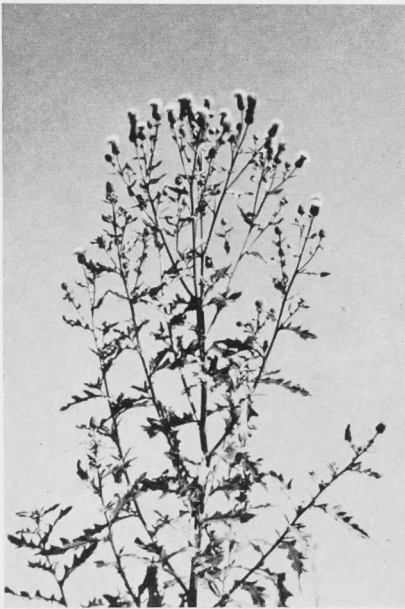
CANADA THISTLE

(*Cirsium arvense*)

SINCE Canada Thistle was introduced from Europe, its common name is hardly appropriate. It is one of our worst perennial weeds, particularly in relatively moist districts and on irrigated land. The heads are about one-half inch in diameter, numerous and 'dioecious.' The latter term is used to describe species which have male and female plants. Some plants of Canada Thistle produce pollen only, and hence no seed; while others do not produce viable pollen, but set seed when pollen from male plants reaches them. The leaves are thorny and very variable in shape. The plants reproduce by extensively creeping rootstocks and by seed which is carried great distances by the wind. The pappus ('parachute') was removed from the seeds illustrated in Plate IV *i*.

Canada Thistle is a very serious problem in grain fields of the prairie

provinces. It has been learned that the reserve food supplies in the roots and rootstocks are at their lowest ebb just before the plants blossom. Hence, deep plowing during the early blossom stage followed by repeated cultivations continued until freeze-up is recommended. The year following, a heavy seeding of barley and thorough fall cultivation will, with luck, almost, if not quite, eradicate the infestation. Top growth may be killed by a single treatment with 2, 4-D. Repeated applications are usually required for eradication.



CANADA THISTLE

RUSSIAN KNAPWEED

(*Centaurea repens*)

RUSSIAN Knapweed belongs to the same genus as does the familiar Bachelor's Button. It is believed to have been introduced into the province of Alberta with seed of Turkestan alfalfa. So far, it has not turned up in Manitoba. Russian Knapweed has recently been found in Saskatchewan. It is a very persistent perennial with an extensive, tough, deeply penetrating and creeping root system. The plants are commonly about two feet in height, extensively branched and rough. Mature stems are tough and woody. The heads contain numerous flowers, and are usually rose-purple in colour. The danger from infestations of Russian Knapweed is recognized in the Dominion Seeds Act, in which it is defined as a prohibited noxious weed.

Control of this weed by cultivation is difficult since it is capable of competing successfully with almost any crop. Eradication cannot be effected in a single year. In "Weeds of Alberta" it is stated that two years of black summerfallow are required.

Russian Knapweed can be controlled to some extent with 2,4-D but repeated heavy applications over a considerable period may be required to eradicate it.



RUSSIAN KNAPWEED

GOAT'S BEARD

(*Tragopogon pratensis*)

ACCORDING to Muenscher ("Weeds"), Goat's Beard is a biennial; but Howitt and MacLeod ("The Weeds of Ontario") describe it as perennial. From observations made in the prairie provinces we are inclined to favour the biennial view. It is an introduced weed, already widespread in the prairie provinces and is extending its range and frequency annually.

The flowering heads are large and pale yellow in colour. They contain numerous ligulate flowers, but no tubular ones. They are essentially similar to the heads of Dandelion and Perennial Sow Thistle, but larger. This weed is so conspicuous that it attracts much attention. During the past few years, Line Elevators Farm Service has had more enquiries about the identity of Goat's Beard than about any other single weed. Fortunately its bark is worse than its bite, since it is rarely, if

ever, troublesome in cultivated fields. It frequents road ditches and abandoned fields. The seeds are relatively enormous and are carried great distances by the wind. The 'parachutes,' which are well shown in the accompanying photograph, were removed from the seeds illustrated in Plate IV *k*. Goat's Beard, like its Perennial Sow Thistle relative, is probably here to stay.



GOAT'S BEARD

This weed can be controlled with 2,4-D but fairly heavy dosages at early growth stages are recommended.

DANDELION

(*Taraxacum officinale*)

THE Dandelion is a first-class example of a plant which has emigrated from Europe and become a much worse pest in its new surroundings than at home. Few people realize the rapidity with which the Dandelion has spread. In 1921 the author of this bulletin was armed with a stout sort of screw-driver affair and instructed to remove all Dandelions from the experimental fields and roadways at the University of Saskatchewan. He found the job much to his liking, an easy one, for he could find only a few stray plants on the whole property. Now practically all cities and towns in the prairies are overrun with Dandelions.

For many years it appeared that the elimination of Dandelions from boulevards, large lawns and public grounds would be an impossible undertaking. However, in 1944, a new selective chemical weed killer of great potency, a hormone-substance called 2,4-D, was introduced to agriculture. Since then it has been clearly demonstrated that proper applications of 2,4-D will kill most common lawn weeds without causing serious harm to ordinary lawn grasses. The discovery of this remarkable chemical has changed the whole picture of Dandelion control. 2,4-D has proved to be effective for the control of Dandelions in lawns, large or small, and other turfed areas. It is the most useful herbicide now known for this purpose. However, 2,4-D should not be used on bent grass turf. Consult your local weed authorities for latest information. The most important feature of control on small private lawns is still, of course, that of maintaining a thick healthy cover of grass.

The Red Seeded Dandelion (*Taraxacum erythrospermum*) is also quite common. It differs from the common Dandelion in having smaller heads, bright red seeds and more deeply cut leaves.



DANDELION

PERENNIAL SOW THISTLE

(*Sonchus arvensis* var. *glabrescens*)

MANITOBA farmers have a healthy respect for Perennial Sow Thistle. Some years ago the Red River Valley was as yellow with Sow Thistle as parts of the Regina Plains are with Wild Mustard. The problem has been met successfully by means of fall tillage and black summerfallow.

In Saskatchewan and Alberta, Perennial Sow Thistle appears determined not to be outdone by its Dandelion cousin, and is spreading very rapidly, particularly in the park and wooded areas.

Perennial Sow Thistle multiplies by means of seeds and rootstocks. The latter are quite brittle and, unlike most perennial weeds, Sow Thistle pulls out of the ground easily. This characteristic also makes it easier to effect a complete kill by means of surface tillage.

The Perennial Sow Thistle to which the above Latin name applies has sort of greyish-green stems and is *hairless*. This is the typical Manitoba form. Another variety (*Sonchus arvensis*) is beset with brownish

glandular hairs on the upper parts of stem and leaves. The glandular hairy variety is the dominant form in eastern Canada and British Columbia. Mr. Groh informs us that, according to his surveys, the glandular hairy variety is comparatively rare in Manitoba, and increases westward until west of Edmonton the two varieties occur in roughly equal proportions.

Perennial Sow Thistle is not a native, but a conspicuously successful immigrant from Europe.

The top growth of Perennial Sow Thistle is readily killed with 2,4-D. Repeated applications are usually required for its complete eradication.



PERENNIAL SOW THISTLE
(See, also, Frontispiece)

PRICKLY LETTUCE

(*Lactuca scariola*)

LACTUCA is the ancient name of cultivated lettuce, and is derived from the word *lac*, meaning milk. This, of course, has reference to the milky juice. Prickly Lettuce is another European introduction. What a country this might have been had we left all weeds at home! It is a common and widespread winter-annual, inhabiting fields, roadsides and waste places. The plants often reach a height of three feet or more. They are profusely branched, and the branches are slender and drooping as illustrated in the accompanying photograph. The heads are of the same general type as those of Dandelions, but paler yellow and much smaller. The leaves are deeply cut with broad lobes, though another variety (*Lactuca scariola* var. *integrata*), which is characterized by oblong entire leaves, except the lowest which are lobed, is also common. The midribs of the leaves are armed with prickles. The stems are usually smooth or slightly prickly.

Prickly Lettuce seldom gives trouble in grain fields, but is a coarse unsightly weed. Since it is a winter annual, fall cultivation and the removal of plants in the summer before seed ripens will prevent it from multiplying. Of course, like many other members of this family, the seeds of Prickly Lettuce are equipped with parachutes (removed in Plate IV *n*) which enable them to be carried long distances by the wind.

Prickly Lettuce can be controlled with 2,4-D. Fairly heavy rates of application are required and early treatment is essential.



PRICKLY LETTUCE

BLUE LETTUCE

(*Lactuca pulchella*)

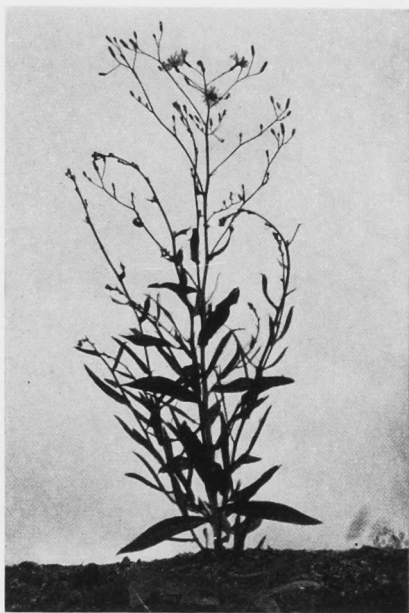
BLUE Lettuce is a native perennial. The stem and leaves are greyish-green in colour, and contain an abundance of milky juice in common with all other members of the *Cichorieae* group of the *Compositae*. It spreads quite rapidly by means of underground rootstocks, and produces seed plentifully. This weed is widely distributed, but appears to have a preference for heavy soils and moderately moist conditions.

There seems to be some difference of opinion as to the seriousness of Blue Lettuce as a weed in grain crops. Some farmers appear to keep it in check without difficulty, while others report serious trouble. It certainly thrives in the Red River Valley and on heavy soils in parts of Saskatchewan. Large patches, a quarter of an acre or more in size, have been observed in Saskatchewan wheat fields, and in these patches

the wheat was almost completely crowded out. According to "Weeds of Alberta," it is less difficult to eradicate than Canada Thistle or Perennial Sow Thistle; but "should be eradicated as soon as noticed, or it will in a short time be the cause of greatly reduced yields."

If patches are too large for hoeing or for chemical treatment, it is necessary to resort to well managed summerfallow or intertilled crops.

The top growth of this weed is easily killed with 2,4-D. Repeated applications are required for its complete eradication.



BLUE LETTUCE

HORSETAIL FAMILY

(*Equisetaceae*)

THE members of this family are not true seed-bearing plants. They are fern-like, moss-like, or aquatic plants, without true flowers, which reproduce themselves by means of spores and tuber-bearing rootstocks. Descriptions of plants belonging to the Horsetail Family should properly precede those of the Grass Family. However, as only one member of the family is involved it is more conveniently dealt with here.

FIELD HORSETAIL

(*Equisetum arvense*)

FIELD Horsetail is a perennial weed common to the more humid areas of the Prairie Provinces. It has creeping, branched roots which bear tuber-like food storage growths. Horsetail reproduces from spores instead of seed. The plant has two distinct stages of growth. In early spring a yellowish, unbranched stem with a cone at its tip appears. The cone bears spores which later blow about and may produce new infestations. The first growth soon disappears and is replaced by a green, much branched plant, often said to look like a tiny Christmas tree. This persists until late autumn, and during the growing season manufactures food which is stored in the underground tubers. Horsetail is most troublesome on poorly drained areas or land with a high water table.

Because of its extensive perennial root system and its ability to store food, Horsetail is very difficult to control by cultivation. Summerfallow aggravates the control situation. Drainage, or opening-up the soil by growing alfalfa or sweet clover, helps in its control. Heavy applications of 2,4-D, when plants are small, will severely retard their growth. However, 2,4-D alone will not eradicate Horsetail.



FIELD HORSETAIL

PLATE I



a. Old Witch Grass
(x 3½)



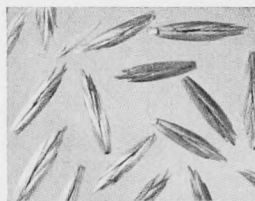
b. Barnyard Grass
(x 1¼)



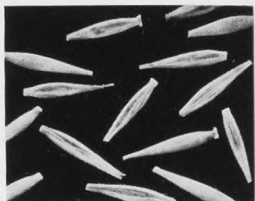
c. Green Foxtail
(x 1¼)



d. Wild Oats
(x 1)



e. Couch Grass
(spikelets x 1)



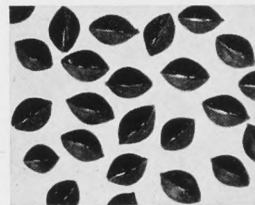
f. Wild Barley
(x 1¼)



g. Dock
(x 3½)



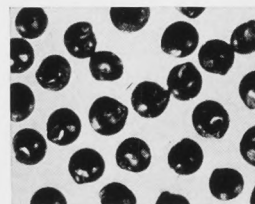
h. Knotweed
(x 1¼)



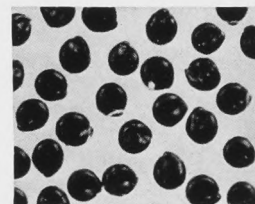
i. Wild Buckwheat
(x 1¼)



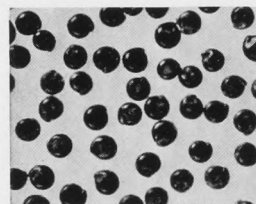
j. Tartary Buckwheat
(x 1¼)



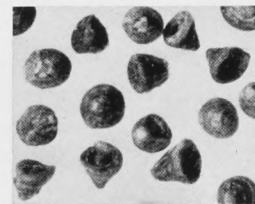
k. Lamb's Quarters
(x 3½)



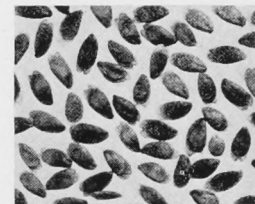
l. Saltbush
(x 3½)



m. Spear Leaf Goosefoot
(x 3½)

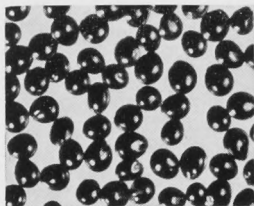


n. Russian Thistle
(x 3½)

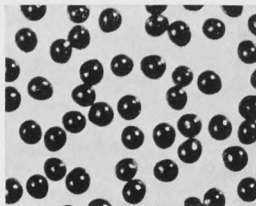


o. Russian Pigweed
(x 1¼)

PLATE II



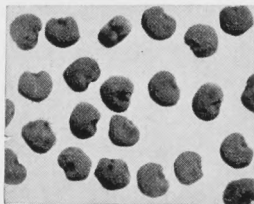
a. Pigweed
(x 3½)



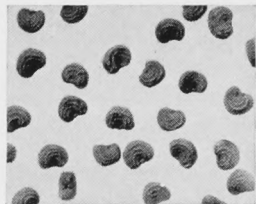
b. Prostrate Pigweed
(x 3½)



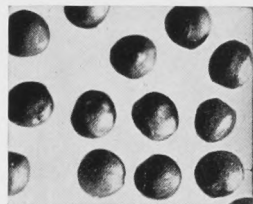
c. Corn Cockle
(x 1¾)



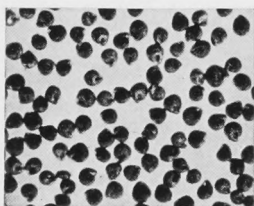
d. Night-Flowering Catchfly
(x 3½)



e. Bladder Campion
(x 3½)



f. Cow Cockle
(x 3½)



g. Purslane
(x 3½)



h. Stinkweed
(x 3½)



i. Peppergrass
(x 3½)



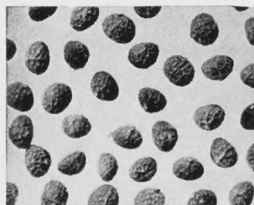
j. Hoary Cress
(x 3½)



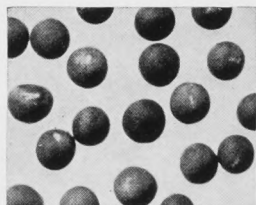
k. Shepherd's Purse
(x 3½)



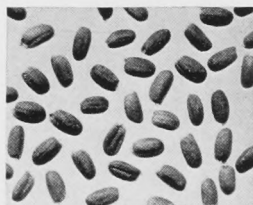
l. Small-Seeded False Flax
(x 3½)



m. Ball Mustard
(x 1¾)

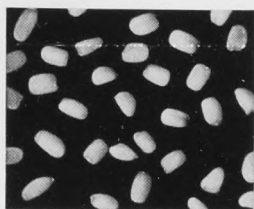


n. Wild Mustard
(x 3½)

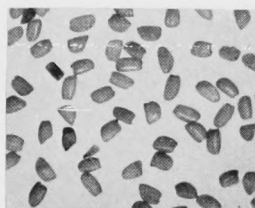


o. Hare's Ear Mustard
(x 1¾)

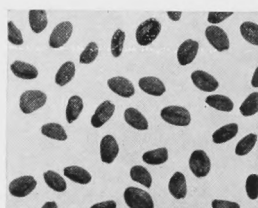
PLATE III



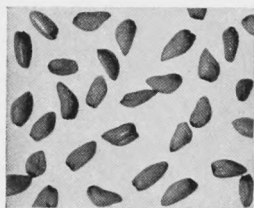
a. Tumbling Mustard
(x 3½)



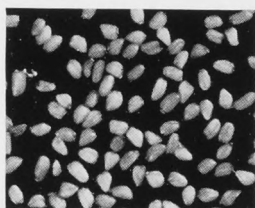
b. Flixweed
(x 3½)



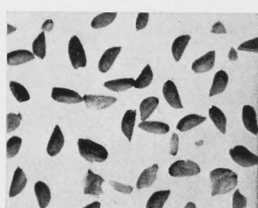
c. Green Tansy Mustard
(x 3½)



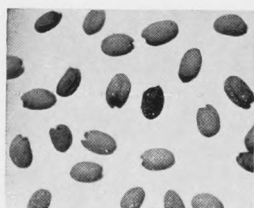
d. Grey Tansy Mustard
(x 3½)



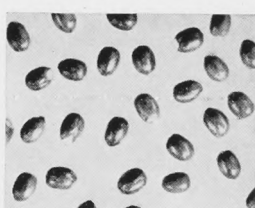
e. Loesel's Mustard
(x 3½)



f. Worm-seed Mustard
(x 3½)



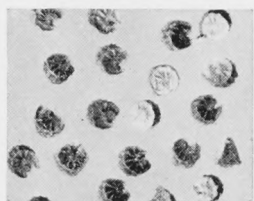
g. Dog Mustard
(x 3½)



h. Leafy Spurge
(x 1¾)



i. Poison Ivy
(berries x 1)



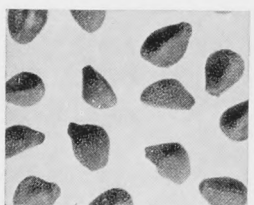
j. Round-Leaved Mallow
(x 1¾)



k. Milkweed
(x 1)



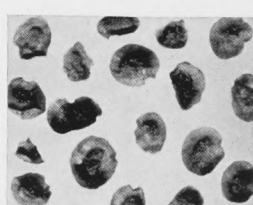
l. Wild Morning Glory
(x 1¾)



m. Field Bindweed
(x 1¾)



n. Blue Bur
(x 2¼)



o. Toadflax
(x 3½)

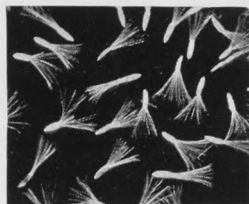
PLATE IV



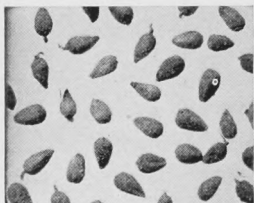
a. Broad-Leaved Plantain
(x 3 1/2)



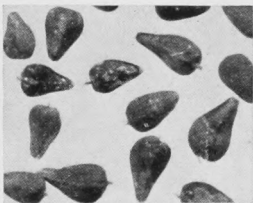
b. Gumweed
(x 2 1/4)



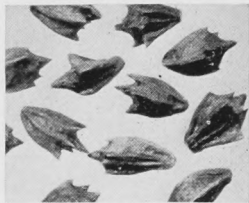
c. Fleabane
(x 1 3/4)



d. Poverty Weed
(x 1 3/4)



e. False Ragweed
(x 3 1/2)



f. Great Ragweed
(x 1 3/4)



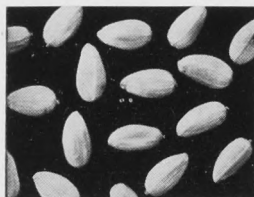
g. Perennial Ragweed
(x 1 3/4)



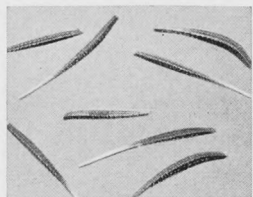
h. Tansy (immature)
(x 3 1/2)



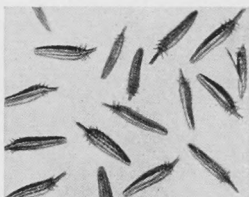
i. Canada Thistle
(x 1 3/4)



j. Russian Knapweed
(x 1 3/4)



k. Goat's Beard
(x 1)



l. Dandelion
(2 1/4)



m. Perennial Sow Thistle
(x 1 3/4)



n. Prickly Lettuce
(x 2 1/4)



o. Blue Lettuce
(x 1 3/4)

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By K. W. Neatby. October, 1941.
- No. 3 WATER EROSION OF SOILS IN THE PRAIRIE PROVINCES AND ITS
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By S. W. Edgecombe. April, 1944.
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- No. 18 SMUT CONTROL IN BARLEY.
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WALL POSTERS: Weed Plant Pictures.

Weed Seed Pictures.

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